TAMPERE UNIVERSITY OF TECHNOLOGY

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AFTERSALES PRICING MANAGEMENT IN GLOBAL B2B ENTERPRISE

Master of Science Thesis

Prof. Petri Suomala has been appointed as the examiner at the Council Meeting of the Faculty of Business and Technology Management on April 4, 2012.

ABSTRACT

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The main objective of this thesis is to improve the pricing process of the case company by assessing its current level compared to literature and propose improvement points. The research problem is divided further into sub-problems: How prices can be maintained and how they can be realized to greatest extent and finally how these two should be applied to the case company considering industry's and company's unique characteristics.

Theory simplifies that 1 % increase in average realized price improves company profitability by 10 %. Price setting is analyzed briefly to explore pricing possibilities and understand the current practices although price setting is out of scope of this thesis. Price realization is analyzed more deeply on the theory side especially focusing on tools which can be used to identify where the money is lost. This part of theory uses a lot of six sigma terminology and tools more commonly seen in operations management.

The results show that biggest gains in controlling prices are gained by training sales representatives and their assistants who place the sales orders into ERP. Globally standardized practices in placing and processing sales orders in ERP make following them easier and is less prone to confusion.

Finer segments should be measured independently and later treated differently from one another to set multiple price points to gain more market and more profit. When such segmentation and fact-based intelligence gathering is in place, educated price adjustments can be made.

TIIVISTELMÄ

TAMPEREEN TEKNILLINEN YLIOPISTO
Tuotantotalouden koulutusohjelma

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Diplomityön päätavoite on kehittää case-yrityksen hinnoitteluprosessia arvioimalla sen tasoa verrattuna kirjallisuuteen sekä esittää kehitystoimenpiteitä. Tutkimusongelma voidaan jakaa kahteen alaongelmaan: Kuinka hintoja pitäisi hallita ja kuinka ne voidaan realisoida parhammalla mahdollisella tavalla sekä kuinka tätä tietoa voidaan soveltaa case-yritykseen ottaen huomioon toimialan ja yrityksen ominaisuudet.

Teoria yksinkertaistaa että 1 % nousu keskimääräisessä realisoidussa hinnassa nostaa kannattavuutta 10 %-yksikköä. Hintojen asetantaa on tutkittu lyhyesti jotta hinnoittelun mahdollisuudet ja nykyiset käytännöt tulevat ymmärretyiksi vaikka itse hintojen asetanta on tämän diplomityön rajauksen ulkopuolella. Hintojen realisointia on tutkittu syvemmin erityisesti keskittyen työkaluihin, joita voidaan käyttää liian alhaisten hintojen kautta menetetyn rahan arviointiin. Tämä teoria käyttää paljon six sigma –terminologiaa, mitä enemmän käytetään toiminnanohjauksessa.

Tulokset kertovat, että suurimmat hyödyt hintojen hallinnassa saadaan kun myyntihenkilökuntaa koulutetaan. Globaalisti standardisoidut käytännöt tilausten kirjaamisessa ERP:iin vähentävät sekaannuksia ja helpottavat tilausten seurantaa.

Hienojakoisempia segmenttejä pitäisi mitata kutakin erikseen ja myöhemmin niitä pitäisi kohdella eri tavalla jotta useita hintoja voidaan käyttää myynnin ja voittojen kasvattamiseksi. Kun mainittu segmentointi ja fakta-pohjainen tiedon kerääminen on asetettu, perusteltuja hinnoittelupäätöksiä voidaan tehdä.

PREFACE

This long thesis project lasted over two years mainly because of an exchange year in France which my supervisor at case company, AH, generously approved. It has been a long process, but thankfully it is over.

The thesis was written alongside normal work duties in the case company. It has been completely individual work without any outside help. I would like to thank the entire team where I worked for great experiences, support and skills they taught. A special mention to V-MA for his great understanding as well as education I received from him.

A great thanks for my examiner, Petri, for good advice and valuable feedback.

9 March 2014

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Aaro Kauppinen

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1. INTRODUCTION

1.1. Pricing Management

Product price is one of the fundamental basics of marketing. It is one of the four parts of marketing mix or four P's which is covered by marketing textbooks. (Kotler and Keller 2008, pp. 62-63) Price's effect on profitability is significant: 1 % increase in price leads to around 10 % increase in profitability: (Marn and Rosiello 1992) 11,2 % and (Baker *et Al.* 2010) 8,7 %. Yet executives have misperceptions that increasing prices will not benefit the company as lost volume undermines the margin gains. The source of this misconception is use of cost oriented pricing which disregards customer's perception of value. (Morel *et Al*. 2006).

Less than 15 % of companies do any systematic research on pricing (Clancy and Shulman 1993). 37 % of companies in industrial markets use a cost-based approach to pricing (Hinterhuber 2008, p. 408). Besides these sub-optimal pricing processes, in business-to-business selling context optimal prices are rarely achieved. The authors of Six Sigma Pricing explain: Company with thousands of different products in a dynamic market with continuously changing competitive and customer situations rarely allow a company to set the optimal price. Even if the optimal price was known the actual realized price tends to be lower: each deal tends to have a negotiated price, and sales representatives having incentives to increase revenues not profits tend to support discounting. (Sodhi and Sodhi 2007, xix) A lot of money "is left on the table" because of problems in pricing.

Focus of the thesis is to identify improvement areas where pricing practices lag significantly behind theory and find reasons for the lag. Ultimate goal of this thesis is to suggest feasible practices for the case company to support pricing function and price management.

1.2. Case company

Case company is a global supplier of technologies and services for a variety of process industries. On 2011, company's total revenue was several billion euros, with revenue and profitability growth compared to 2010. One of the process industries served is that related to rock crushing, which is the focus industry of this research. Customers in that industry are mining and construction customers who use crushed rock for materials like asphalt and concrete or refine them further to separate valuable minerals. Case company serves these customers with crushers and other related process equipment and systems and with services including aftersales support. Equipment business unit and services

business unit are roughly of equal size in terms of revenue. In this study, only services side is considered.

A rock crusher is a machine that breaks stones smaller by applying force. Rock is crushed by impact, pressure, and abrasion. Rock is crushed to reduce its size or form it to another shape. The force that is used to crush rocks also causes wear and tear to the crusher, which is typically absorbed by a wear part made usually from specialty manganese steel. The toughness of the steel is able to withstand the deformative force and keep the machine safe. Still the wear parts need to be replaced regularly to keep the crusher operational. Spare part on the other hand is a typical part of any mechanical device that has any other function than absorbing damage from the crushing action. Parts ranging from small screws and washers to complex assemblies are characteristic spare parts. In general, wear parts are steel casts and designed to be replaced often and spare parts require machining and other precise work and are replaced only if previous part breaks or is about to break. In the case company, both spare and wear parts, when sold individually as aftersales products, are considered to be part of services business unit.

Global players in the mining machinery industry include Atlas Copco (Sweden), Caterpillar (USA), FLSmidth (Denmark), Joy Global (USA), Metso (Finland), Outotec (Finland), Sandvik (Sweden), and Weir (UK). For construction, the list includes Astec (USA), Atlas Copco (Sweden), Caterpillar (USA), Furukawa (Japan), Metso (Finland), Terex (USA), and ThyssenKrupp (Germany).

Global mining giants and significant regional players operate world's largest mines. There are also small- and medium-sized mining companies. Mining customers process blasted rock that contains ore. Their goal is to crush the rock into very fine dust which can be chemically processed to extract the valuable mineral. Mines are big investments and their duration is decades. They provide a constant need for replacement parts and provide a stable stream of revenue. Their crushers are typically unmovable and have high capacity.

Construction customers on the other hand are a fragmented market. They consist of small- and medium-sized customers, but there are also some major crushed rock aggregate producers. Two common construction customers are quarries and crushing contractors. Quarries crush rock for asphalt, sand and other aggregates. Crushing contractors provide crushing in construction sites and other locations where rocks need to be crushed into smaller pieces for example for reuse or transportation. Their crushing solutions are mobile and they aim to produce little waste, noise and dust.

1.3. Research

Case company has a centralized pricing management function for aftersales products and its main task is to facilitate global pricing and provide accurate analyses for decision-making support. The process has been evolving and growing as more sales locations join the company ERP and as a need arises for a new viewpoint on pricing. For several years the pricing management function has improved through incremental and especially internal development, and this thesis compares those existing activities to literature highlighting points for improvement.

The goal of this research is to study the most current knowledge of pricing management and apply them to the case company. The research question is how price management function should be executed in a global business-to-business aftersales environment. Viewpoint is from the case company's perspective taking into account the existing pricing management process. Although the problem is very specific, especially the theory from literature research can be applied widely to many accounts.

The research problem can be divided further into sub-problems: How prices can be maintained and how they can be realized to greatest extent and finally how these two should be applied to the case company considering industry's and company's unique characteristics. These are being analyzed one at the time in such a way which leads to an answer to the research question. Price-setting is out of the scope of this thesis, rather the key is to define global processes that can support pricing with accurate internal analyses. That being said, the research will focus on price accuracy measurement and control.

The scope of this research is bound to actual applicable techniques and their use for various purposes and recommending their use. The techniques are utilized in exploratory fashion to the extent of capabilities of case company's current pricing function's available tools and data: tailored market studies will not be conducted for this thesis. Also for data analysis, only selected product groups and market areas are analyzed to reduce the scope, the applicability of tools can be tested even with this limited scope.

1.4. Structure of the thesis

After the introduction chapter, this thesis is divided to five theory chapters, first underlining the importance of pricing, second giving a broad overview on pricing management and third one on price setting. Fourth one covers segmentation which is important from the price setting point of view albeit being very specific compared to previous chapters. Fifth theory chapter covers price realization and control to the extent current literature covers it. Theory chapters are followed by a chapter on research methodology, results and conclusions.

2. WHY PRICING IS SO IMPORTANT

Literature sources say that 1 % increase in price leads to around 10 % increase in profitability: (Marn and Rosiello 1992) 11,2 % and (Baker *et Al.* 2010) 8,7 %. In a simple company, which has production quantity Q, variable costs C_V, fixed costs C_F, and product price P has profits, I, according to formula 1.

$$I(Q, C_V, C_F, P) = Q(P - C_V) - C_F \quad (1)$$

Price minus variable costs gives the product contribution. That contribution multiplied by quantity gives total contribution. When fixed costs are taken from total contribution, profit is what remains. Profit change per one unit change can be seen from partial derivatives of the previous formula.

$$\frac{\partial I}{\partial Q} = P - C_V \quad (2)$$

$$\frac{\partial I}{\partial C_V} = -Q \quad (3)$$

$$\frac{\partial I}{\partial C_F} = -1 \quad (4)$$

$$\frac{\partial I}{\partial P} = Q \quad (5)$$

The partial derivatives 2-5 directly tell how much in absolute terms change in each of the variables changes the total profits. Increasing sold quantity by one increases profits by the amount of contribution. Decreasing variable costs by 1 € improves profit by 1 € per sold piece, the same amount as increasing price by 1 €. Decreasing fixed costs by 1 € increases profits by 1 €. A profitable company has prices above variable costs and fixed costs divided by the produced quantity. See formula 6 below.

$$P > C_V + \frac{C_F}{Q} \quad (6)$$

In addition to the limit above, all four variables $Q, C_V, C_F, and\ P$ need to be positive. The relative change is obtained by multiplying the partial differential functions with the variable it was created with respect to.

$$Q\frac{\partial I}{\partial Q} = Q(P - C_V) \quad (7)$$

$$C_V \frac{\partial I}{\partial C_V} = -QC_V \quad (8)$$

$$C_F \frac{\partial I}{\partial C_F} = -C_F \quad (9)$$

$$P \frac{\partial I}{\partial P} = PQ \quad (10)$$

From the formula 7 it can be observed that 1 % increase in quantity results in $0{,}01 \times Q(P - C_V)$ improvement in profit. Similarly following formula 8, 1 % decrease in variable costs result $0{,}01 \times QC_V$ increase in profit. From the limits set before, it is possible to note that price has highest relative effect to profits.

$$PQ > Q(P - C_V) \Leftrightarrow P > P - C_V \quad (11)$$

$$PQ > QC_V \Leftrightarrow P > C_V, because\ P > C_V + \frac{C_F}{Q} \quad (12)$$

$$PQ > C_F \Leftrightarrow P > \frac{C_F}{Q}, because\ P > C_V + \frac{C_F}{Q} \quad (13)$$

In equations 11-13, results from equations 7-9 are compared against the result of equation 10. Equations 9 and 10 also consider limit from formula 6. The rest of the variables can also be set in order by their effect in profits. Increasing quantity is more profitable if product contribution is higher than variable costs (14), otherwise it is more profitable to reduce variable costs (14, 16). Similarly if variable costs are higher than fixed costs per product, it is more profitable to reduce variable costs than to reduce fixed costs (15). Increasing quantity is always more profitable than decreasing fixed costs when the company is profitable (16). See figure 1 below for a graphic presentation.

$$Q(P - C_V) > QC_V \Leftrightarrow P - C_V > C_V \Leftrightarrow C_V < ½P \rightarrow PM > 50\% \quad (14)$$

$$QC_V > C_F \Leftrightarrow C_V > \frac{C_F}{Q} \quad (15)$$

$$Q(P - C_V) > C_F \Leftrightarrow P > C_V + \frac{C_F}{Q}, because\ P > C_V + \frac{C_F}{Q} \quad (16)$$

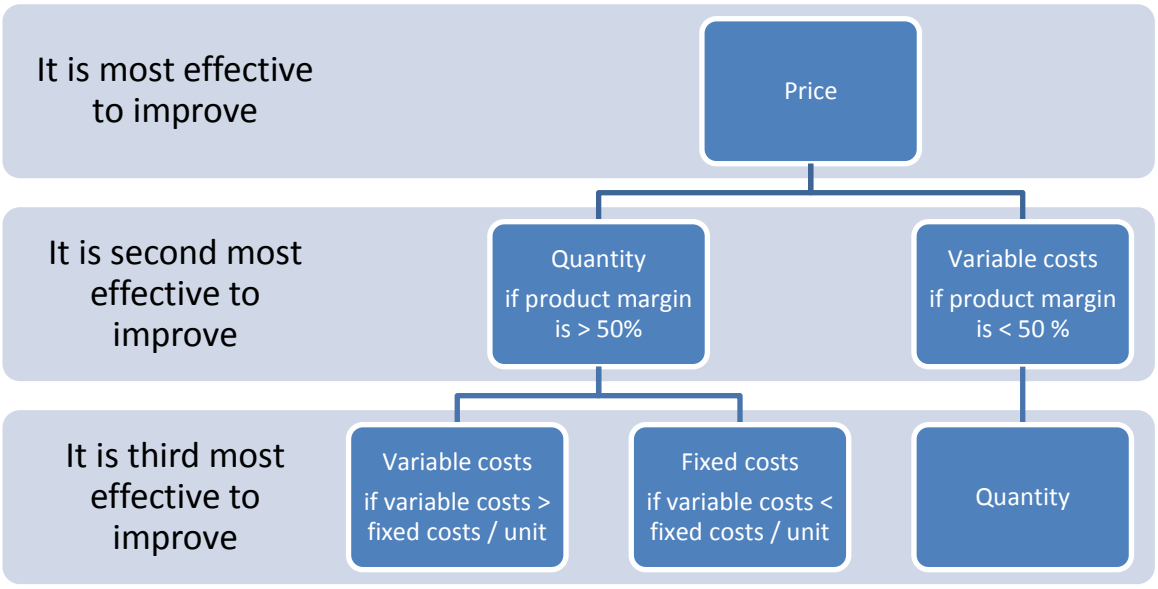

Fig. 1. *Relative impact to company profitability, when company is profitable.*

The picture 1 above is based on relative amounts, i.e. percent changes, instead of absolute values. Euro saved from variable costs is as valuable as increasing product price by one euro. Taking that into consideration, it is always most profitable to increase price than to reduce costs or sell more. It is equally true that giving discounts from price decreases profitability more than selling less. These observations are only valid when a company sells one type of item at one fixed price. Accurate cost allocation can extend the applicability to multiple products business. In addition the temporal aspect is not taken into account; costs and revenue accrue at the same time and immediately. Most importantly price elasticity is not taken into account. An example calculation on price elasticity reveals that if product's cost structure is 70 % variable costs, 21 % fixed costs and 9 % profit, as according to (Marn and Rosiello 1992), the 1 % price increase and its benefit of 11 % on profitability is negated if price elasticity for the product is -3,3.

(Kotler and Keller 2008, pp. 425-428) explain briefly that knowing demand is very important for setting prices. It is likewise important to know price elasticity of demand. Price elasticity of demand tells how much a change in price effect change in demand. The more elastic the demand, the more price change effects quantity change. Similarly the more inelastic the demand the less price change effects demanded quantity. Picture 2 below visualizes elastic and inelastic demands.

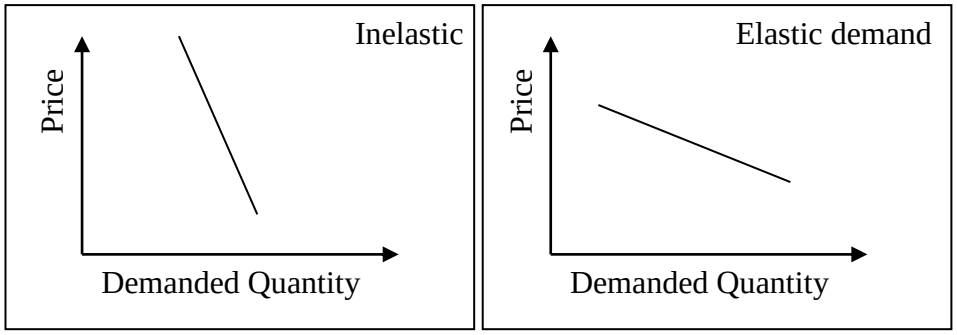

Fig. 2. *Inelastic and elastic demands curves.*

As the picture 2 illustrates, in inelastic demand the price change results in much smaller demanded quantity change than in elastic demand. Elasticity is the relation of function value change to input value change. Elasticity's formula is presented below.

$$E_{x,y} = \frac{\partial \ln(y)}{\partial \ln(x)} = \frac{\partial y}{\partial x} \times \frac{x}{y} \approx \frac{\%\Delta x}{\%\Delta y} \tag{17}$$

The approximation is more accurate the smaller the percent change is. Using the percent approximation (17), it is possible to draw the demand curve for given elasticity. Below is drawn the E = -3.3 elasticity, which was mentioned earlier in this section using reference price as 100 and reference quantity as 100.

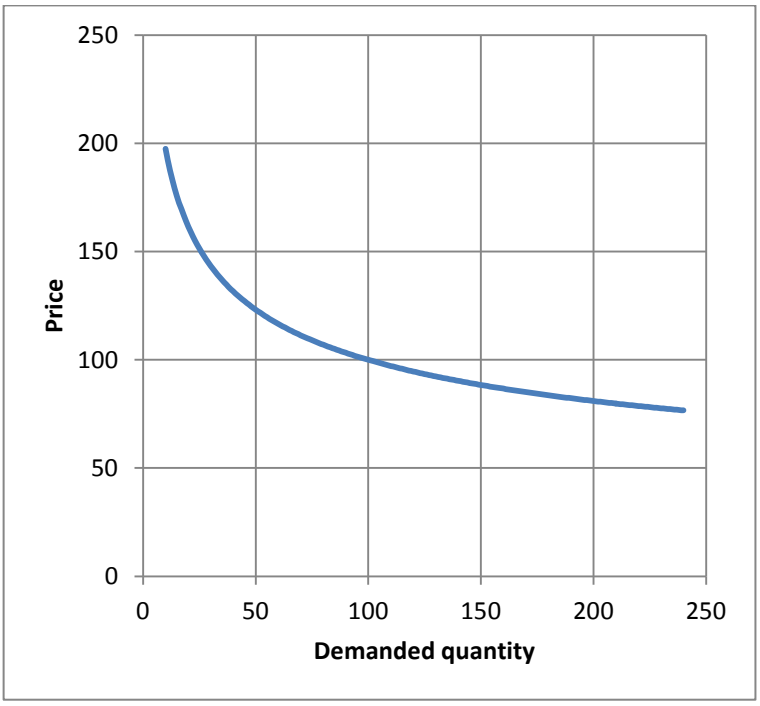

Fig. 3. *Demand curve at price elasticity E = -3.3.*

As graph 3 shows, the higher the price, the lower the demanded quantity. Similarly for more sales quantity the lower the price needs to be. Combining demand curve and the

production function gives a possibility to reach mathematically optimal price and quantity when price elasticity, variable and fixed costs are known. The optimum points are calculated using Excel add-on *Solver* and graphs 4-6 are drawn based on the results.

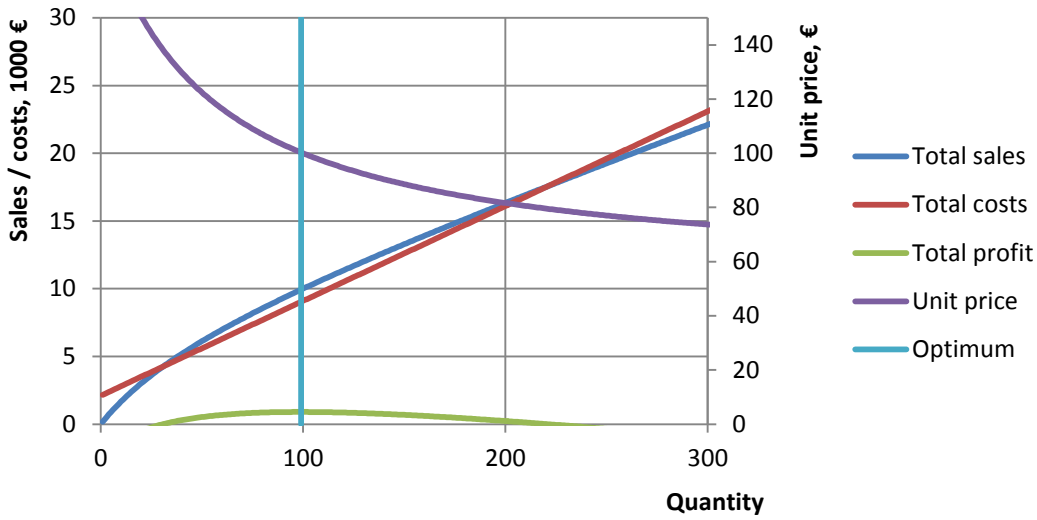

Fig. 4. *Production function with demand curve. Unit price on secondary axis.*

In the picture 4 above, fixed costs are 2100 €, variable costs are 70 € / product, price elasticity is -3.3, and reference price is 100 €. The more the company makes products, the lower the price would need to be and the fewer products it makes, the higher the price, but also the more there is fixed cost burden to the product. In the example case above with similar input values as in (Marn and Rosiello 1992) study, the optimum quantity sold is 99 units reaching total profit of 900 €. Graphs like this can provide important relational information to find optimal price level for maximum total profits. Pictures below show different scenarios and their optimum price levels for maximum profit.

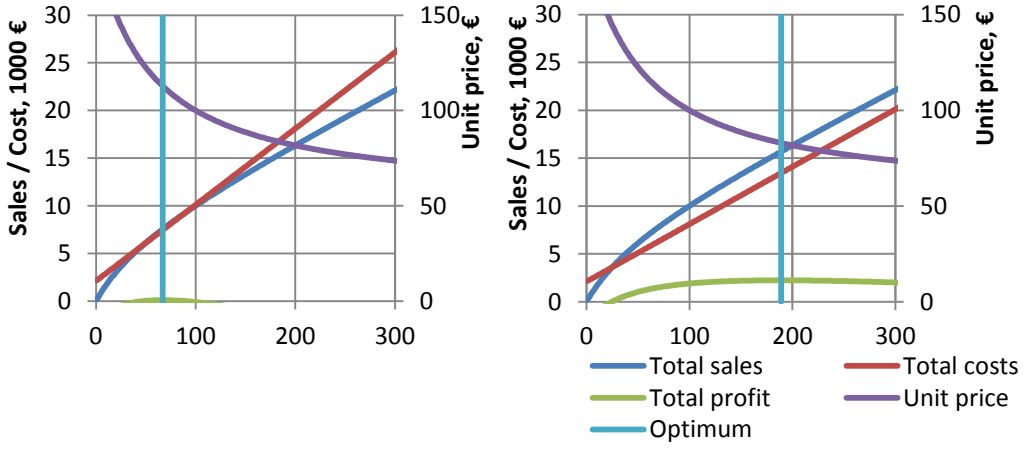

Fig. 5. *Production function with demand curve showing effect of variable cost change.*

In the picture 5 above, the left graph has variable costs increased to 80 € per unit. That would make the company unprofitable with the previous price of 100 €, but reducing the produced quantity and increasing price kept the company profitable reaching optimum at 67 sold units and 94 € total profit. Similarly on the right, variable cost reduction of 10 € to 60 € suggests that price should also be reduced to 83 € for reaching optimum profit of 2234 € at 189 units sold. These calculations assume that increase of produced quantity doesn't increase fixed costs. If company didn't decrease the price of the product, it would still gain profits of 1890 € which is over double the profits before. Next, the change of price elasticity is studied in the picture 6 below.

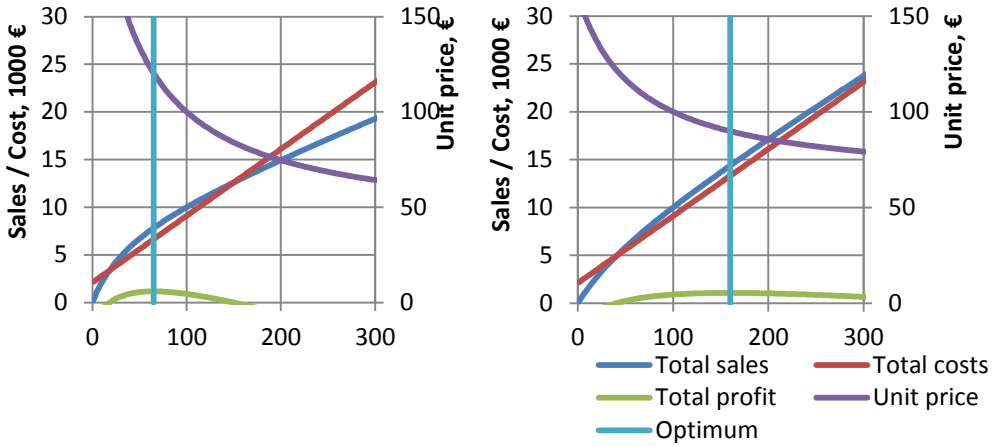

Fig. 6. *Production function with demand curve showing effect of price elasticity change.*

In the left graph of picture 6, the price elasticity is higher, -4.3 and for the right it is -2.3. The higher the price elasticity, the less products should be manufactured. In the case pictured on the left, the price is 120 €, produced quantity is 65 and total profits reach 1171 €. On the picture to the right, the values are as follows: price is 90 €, quantity produced is 160 and total profits are 1070 €. Interestingly, both total profit values are higher than in the starting case.

The importance of well-educated and active pricing is highlighted in the examples above. A company that manages to reduce variable costs but doesn't adjust prices accordingly leaves 344 € of unrealized profits and 5674 € unrealized revenue behind. Careful analysis of market and its changes as well as effective segmentation resulting different demand curves for each segment can increase net profits as well.

Kotler and Keller (2008, pp. 425-428) list several factors affecting the demand of a product. Customers tend to be less price sensitive when there are no or few substitutes or competitors, they don't readily notice the higher price, they are slow to change their buying habits, they think the higher prices are justified or if the price is only a small part of the total cost of obtaining, operating and servicing the product over its lifetime. They also mention that customers are less price sensitive if the product is more distinctive,

buyers are less aware of substitutes, buyers cannot easily compare the quality of substitutes, the expenditure is smaller part of buyer's total income, part of the cost is borne by another party, product is used with assets previously bought, the product is assumed to have more quality or buyers cannot store the product. (Bijmolt *et Al.* 2005) in their extensive price elasticity study of 81 studies ran across a set of 1851 price elasticities. They reported that the price elasticity is greatly affected by product life cycle. Newly introduced products have higher price elasticity than those that are mature or in decline. Inflation effects price elasticity; The higher the inflation, the more inelastic the demand. Economic growth rate on the other hand does not affect price elasticity. Also, there aren't meaningful differences in price elasticities of different geographic regions within developed countries. It seems that price and price promotions have increasing effect on price elasticity. They report that the average price elasticity of durable goods in introduction or growth phase is -5.38 and in maturity or decline -3.81.

3. PRICING MANAGEMENT

62 % of companies with revenues more than one billion USD have a Pricing Manager. The smaller the company is the lower percentage has pricing managers. In general, companies with pricing function have fewer than 50 persons involved in pricing. The pricing function usually reports to senior management or to the marketing department. See picture below. (Carricano *et Al.* 2010)

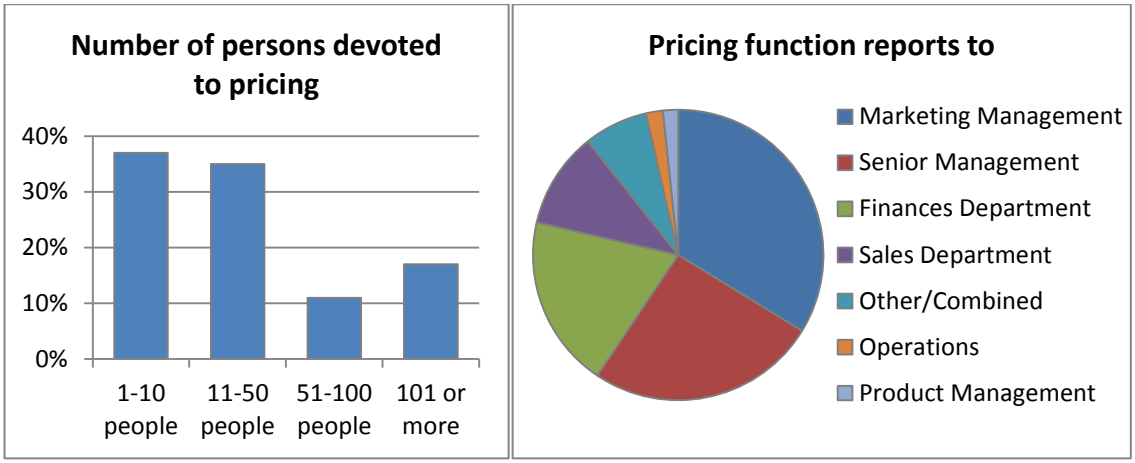

Fig 7. *Pricing management demographics according to Professional Pricing Society (2009)*

The figures in picture 7 are based on a study on Professional Pricing Society's members. There were 917 respondents on December 2009. (Professional Pricing Society 2009) Professional Pricing Society is "founded in 1984, [and] it now serves thousands of members, representing all leading industries and over 50 countries." (Professional Pricing Society 2008)

Pricing management can be divided into two measures. (Hinterhuber and Liozu 2012) describe one measure being prize orientation and the other prize realization. Price orientation describes which method of pricing the company uses: value-based, competition-based or cost-based pricing. Price orientation tells how institutionalized and organized the pricing function is. Weak price orientation means that the sales personnel can set the prices by themselves within a certain profitability limits, where strong price orientation means that the company tells the price through lists or other tools and discount levels are set beforehand based on order size, customer size and other factors. Illustration 8 below shows the 3x3 matrix presented in the article. (Hinterhuber and Liozu 2012)

Price orientation				
	Customer value-based pricing	Value Surrender Zone		Pricing Power Zone
	Competition-based pricing		Zone of Good Intentions	
	Cost-based pricing	White Flag Zone		Price Capture Zone
		Weak	Medium	Strong
		Price realization		

Fig. 8. *The pricing capability grid according to Hinterhuber and Liozu (2012).*

(Hinterhuber and Liozu 2012) argue that the best orientation for pricing is customer-value based. They think competition-based pricing is the second best option and cost-based pricing is the least optimal. The different pricing approaches are discussed more in-depth later in section 4. Price realization is discussed in-depth in section 5. In the matrix above the pricing power zone is the most optimal, where the prices are good and there is no uncontrolled discounting. White flag zone on the contrary has prices set based on costs and sales personnel have great personal, uninformed impact on final price. In value surrender zone the pricing method results a good price, but the haphazard discounting practices undermine otherwise well-managed pricing. The price capture zone on the other hand has strict guidelines for sales personnel but simplistic price-setting methods result a sub-optimal pricelist. In the middle there is a zone of good intentions where prices are set based on competition and sales personnel have discipline in price realization, but the company is stuck at following prices of others instead of looking inward to its own product capabilities.

Frank (2003), Sodhi and Sodhi (2005) followed by Zornig (2006) link pricing function to six sigma principles usually practiced in manufacturing. Aforementioned articles describe that the pricing function should consist of people in pricing, finance, marketing, IT and sales and the cross-functional team should have assistance of a six sigma specialist. Also other sources mention that pricing should have access to a lot of data (Davidson and Simonetto 2005), (Challa 2010), (Hinterhuber 2008) and know-how to analyze it. Especially Davidson and Simonetto (2005) present different IT-solutions for managing price, and there indeed are dozens of pricing software to support right pricing decisions. As discussed later, cost-based pricing requires data especially from company's internal systems, competition-based pricing requires data from the market

and of competitors, and value-based pricing requires information of customer preferences. Also for systematic feedback about pricing decisions, follow-up analysis on sales in required (Frank 2003), (Sodhi and Sodhi 2005), (Marn and Rosiello 1992), (Sinclair 1993), and (Kohli and Suri 2011).

4. SETTING THE PRICE

(Kotler and Keller 2008, pp. 430) explain the concept of price band, which is defined by three C's: costs, competitors and customers. It shows the band of possible prices for a product, where the minimum price or floor price is limited by company cost structure and highest possible price or ceiling price is limited by customer willingness to pay. Between these two limits there is competitor price for the same product or of a substituting product. See figure 9 below for graphical representation.

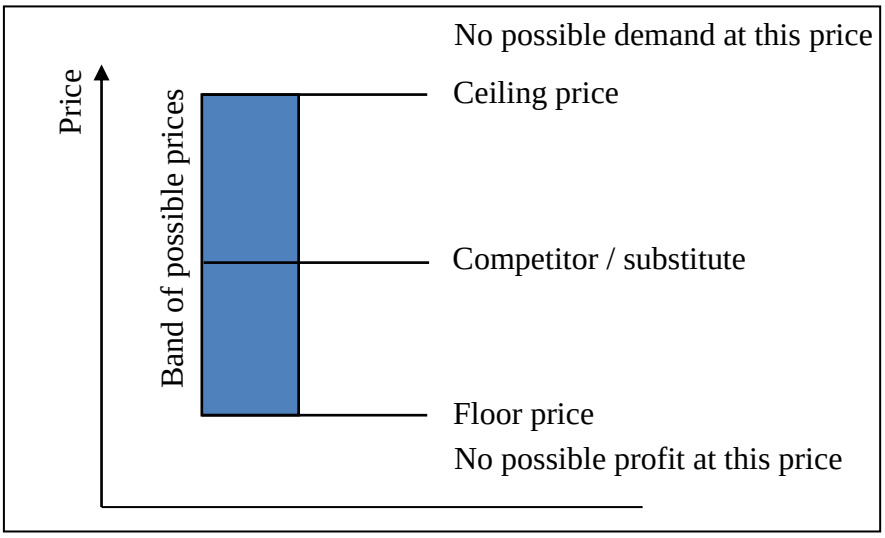

Fig. 9. *Three C's model for price setting according to Kotler and Keller (2008, p. 430).*

Where in the price band the final price is set depends on pricing strategy and used approach to pricing, both which are discussed later. The price in the band can change and vary because of different customer interests resulting in differentiation possibilities which can warrant higher or lower price. (Kotler and Keller 2008, p. 430)

Hinterhuber in his extensive study says that most of the companies use competition and cost-based pricing approaches whereas value-based approaches being left third. (Hinterhuber 2008) See picture 10. In literature, also customer relationship-based approaches to pricing are proposed (Biggemann and Buttle 2011), (Argouslidis and Indounas 2010).

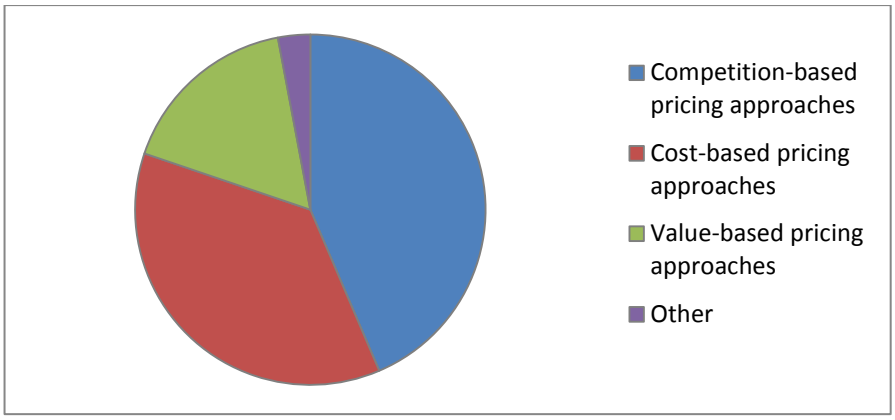

Fig. 10. *Distribution of pricing approaches according to Hinterhuber (2008).*

Below in subchapters, all the previously mentioned four pricing approaches are further described especially taking into account the process requirements to actually manage the prices. Much of the price-setting approaches are based on Hinterhuber's 2008 study, but also other articles are taken into account. First is discussed the cost-based approach, then competition-based, value-based and lastly relationship-based approach. Following the focus of this thesis, which is more oriented to price realization and control, different price setting techniques are studied in explorative fashion.

4.1. Cost-based approach to pricing

Cost-based pricing include cost-plus method, target ROI/ROS pricing, breakeven-based pricing and target contribution margin pricing. (Hinterhuber 2008) They focus on company's cost structure and rely on internal accounting data for setting the price. It is required in later discussed pricing methods as well to assure profitability and it can be used as a minimum price.

Cost-plus method takes the average cost of a product and then adds target profit margin. For example if variable costs are 7000 € and fixed costs are 2100 € for the same period for total cost of 91 € per product, then price would be 101 € for target 10 % profit. If raw material cost would increase, the price of the product would increase as well to keep the 10 % earnings. A company which produces multiple products would use activity-based or similar costing to correctly allocate the fixed costs burden between products.

Target ROI (return on investment) and ROS (return on sales) pricing work very similarly as previously mentioned cost-plus method. The main difference is that the earning percentage is calculated to match either ROI or ROS targets. When the company knows its costs as described in previous paragraph, what should be the price so that the company would enjoy ROI of 15 %? It depends on the company's balance sheet structure. Also many companies refer to ROI of the industry average of the region to ensure competency and not too high price level.

Breakeven pricing uses the same numbers as cost-plus method. The company tries to know how many items it needs to sell for breakeven at a certain price. Then the company can add a quantity buffer to ensure profitability if their sales doesn't reach the forecast quantity. With the same variables average variable costs C_V and long-term fixed costs C_F, how many products the company needs to sell at price 100 € for breakeven and how many more to have a 10 % buffer?

$$Q = \frac{C_F}{P - C_V} \tag{18}$$

$$\frac{2100\ €}{100\ {}^{€}/_{pcs} - 70\ {}^{€}/_{pcs}} = 70\ pcs$$

If the company sells 70 units at price 100 €, it covers all its costs and is breakeven. To have a 10 % buffer, it would need to sell 77 units.

Target contribution margin pricing sets prices only based on variable costs. It makes pricing easier when there are many products manufactured as the fixed costs don't need to be allocated. Although then there can be unprofitable products in the portfolio left unnoticed

A general problem of cost-based pricing is that they rely only on internal company data and usually historical data of costs. Historical data doesn't necessarily match with the future cost structure and trends in raw material and labor prices can be difficult to anticipate. Certain pricing methods like experience curve pricing (Kotler and Keller 2008, p. 429) try to estimate future costs as a foundation for pricing, but they aren't accurate either. Especially for companies that produce and sell many different products costing is difficult as fixed costs need to be allocated and that allocation can go wrong. Cost-based methods don't take into account customer preferences or market price levels, which usually leads to over- or underpriced products.

4.2. Competition based approach to pricing

Competition based pricing takes into account the market price level of similar products. Examples of competition based pricing are penetration pricing, price skimming, pricing according to average market prices and price follower behavior (Hinterhuber 2008).

In most markets it is illegal to agree on price level with competitors to set prices higher where they should be. Especially in B2B market it is difficult to get reliable price data as prices tend to vary from location to location, from customer to customer, from salesman to salesman, and list price is just the starting point of the transaction price or pocket price the customer actually pays, which is explained further in section 5.

Penetration pricing is a method of pricing, where product price is set below market level to gain market share. When desired market share is gained, the price is gradually raised to market level. Companies use market share to calculate their revenues as follows:

$$Company\ revenue = price \times market\ share \times market\ size \quad (19)$$

Formula 19 has led companies focusing on market share. Companies also weight that to get enough contribution to cover fixed costs and earn target profit, they need to sell a certain number of products at set price which corresponds to target market share. Penetration pricing is also useful when a new product is introduced to get the customers try the product and get used to it at cheaper price. It is also useful if the aftermarket is a big business resulting long-term profits from customers who bought the initial product.

Price skimming is the opposite of penetration pricing. The starting price of the product is high above the market level and then reduced to market level as the product ages and gains competition. Usually new products are priced using price skimming. A new innovative product is priced above price level and for a certain duration the company has monopoly in the market thus commending higher price. As the product functionality is copied to competing products and market competition becomes fiercer, the prices are reduced to normal level. During the period of premium price, the company tries to cover research and development costs associated with the product and to ramp up production that can have problems as the product is new.

Pricing according to average market price is a method of pricing where market price level is monitored and product price adjusted to it. Especially in markets where products are difficult to differentiate and when there are many companies offering substituting products pricing according to average market price is wise. Price can be set higher or lower than average price which implies higher quality or better cost-effectiveness. Also, if price differs a lot from the average price, the deal might seem dubious to potential customers. Walker (1967) went as far as saying that when mean price and price deviation of competing products are known, market share can be calculated based on product price level using normal distribution. This of course requires products to be identical, which is practically impossible in B2B-markets. Already in the same issue of Harvard Business Review, Philip Kotler's book *"Marketing Management: Analysis, Planning and Control"* was cited mentioning that buyers make decisions not only based on price, but also taking into account other considerations like service, quality and reliability. (Kotler 1967) These are more linked to value-based approach to pricing discussed in the next chapter.

Usually for every market there is a price leader, which has the pricing power to manipulate market price level. Rest of the competition can choose to either compete for the price leader position or to accept price follower orientation. Being a price follower doesn't mean that the company is left for dead. Adjusting product price to match the

price of the price leader and not undercutting too much to avoid retaliation from price leader can be a very profitable position. In terms of pricing it is a very passive price orientation; prices are told by some other company instead of them being acquired through cost analysis or careful market analysis.

4.3. Value-based approach to pricing

Value-based approaches to pricing include perceived-value pricing, performance pricing and pricing according to customer's willingness to pay. They rely on market segmentation and price discrimination. The key information source is the potential customer base and their preferences. Generally the products with functionalities the customers want are priced higher than products which lack those functionalities because customers are willing to pay for those functionalities. Market segmentation is important because not every customer values product functionalities the same way.

Perceived-value pricing is a general value-based approach to pricing. The product to be priced is compared to other products of its category and customers are made to assess how much they would be willing to pay for the company's product compared to other product's price. (Kotler and Keller 2008, 432) This can be done by interviews and surveys. The product functionalities providing benefits to customers are listed, for a B2B product those include production capacity, end product quality, tolerances, ease of use, and safety. Customers rank products with different levels of functionalities based on their preference. With a careful statistical study of customer answers and price levels of reference products, it is possible to estimate value of functionalities and even price elasticity of those. End result of the study will be a competitive price of the company's own product.

Anderson *et Al.* (2000) made a study based on simulated purchase situations for purchase managers. They sought to see if a 20 % value increase (measured by the customer) warrants a 20 % price increase. They refer to utility function by (Kahneman and Tversky 1979) which explains why a person is more likely to choose 450 euro prize he would receive certainly compared to winning 1000 euro prize with 50 % chance. In a short summary, the utility function describes that losses are felt more severe than gains of equal magnitude and that the higher the magnitude, the lower the marginal gain or loss increase. See picture 11 below.

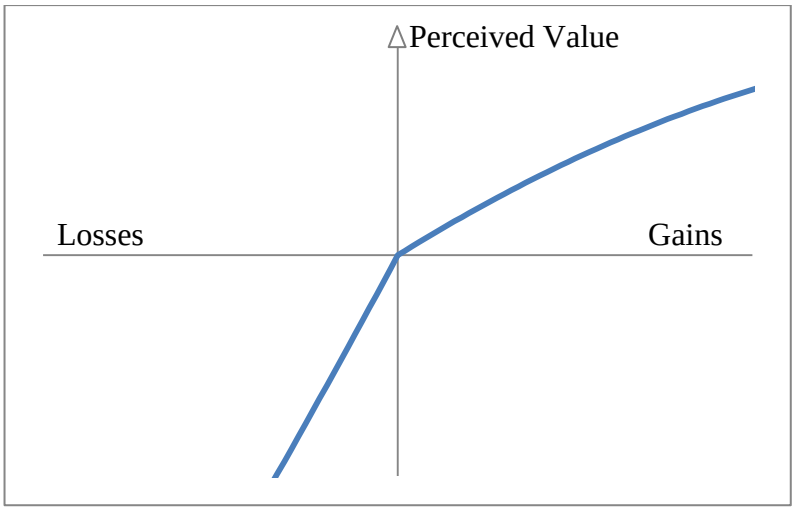

Fig. 11. *Value function according to Kahneman and Tversky (1979).*

The vertical axis on picture 11 shows the true perceived value of a deal or transaction. The losses and gains are the absolute values and can be given a straight monetary value. Losses like payments are considered to be more severe than product benefits. Anderson *et Al.* (2000) took this theory and assumed that transactions in business markets follow the same logic. They also presumed that there is a separate value function for product functionalities which is less steep than price changes. Their rationale being that possible benefits of a product are always not as tangible or risk-free than a straight discount, and on the contrary, poorly featured product which still gets the job done is better for business than paying more for the normally equipped product. Their version of the value functions is pictured below.

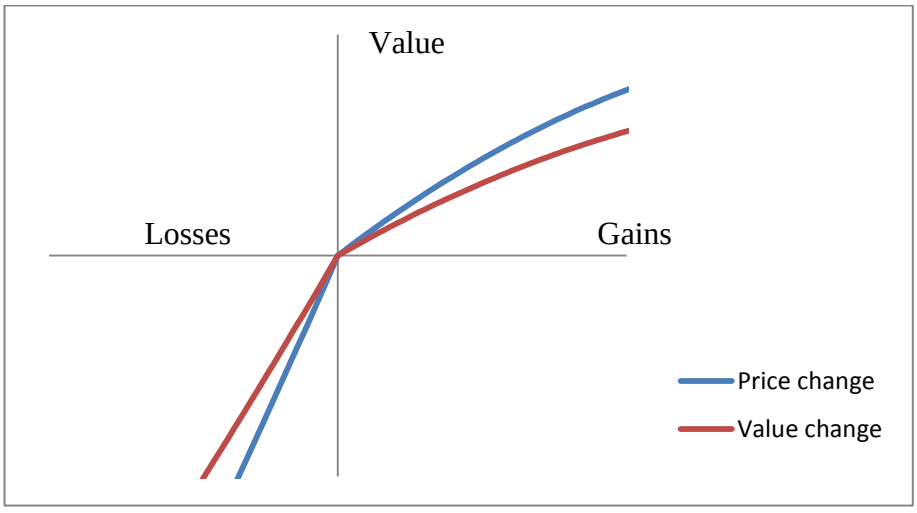

Fig. 12. *Value functions according to* (Anderson;Thomson ja Wynstra 2000)

In the picture 12, the value change curve shows value increase in top right quarter and value decrease in bottom left. It is the value the customer assessed the product functionalities would have over the product's lifetime. Price function shows benefit to

the customer meaning that in top right quarter the price change is actually a price decrease and in bottom left quarter a price increase. The picture shows that a product which would net a customer 100 € more isn't worth 100 € more price from customer's point of view and that a product which would net customer 1000 € more isn't 10 times more valuable than the previously mentioned option. It also predicts that a typical customer would rather take a 100 € cheaper product which would in the long run cost the company 100 € more than any of the previously mentioned as long as the product gets the job done. The less-valued and less-priced product though wasn't the most sought after product in the study, rather the authors explain that purchasing managers avoid change and if some change of product needs to happen, the purchasing managers prefer lowest price increase. (Anderson *et Al.* 2000.) It was noticed after the Anderson *et Al.* study, that purchasing managers use a lot vendor lists and price targets which limits the purchaser's possibilities to adequately compare the offerings. Also the valuation methods employed by the purchase managers vary. (Plank and Ferrin 2002.)

Performance pricing or performance-based pricing is a pricing method where the customer pays a sum based on agreed on performance metrics. The customer is actually paying for tangible results, not for the service or product itself. (Shapiro 2002.) The nature of the offering needs to be at least partly service for using performance pricing. The types of offerings and their usability for performance pricing has been discussed for example by Windahl and Lakemond (2010). Sharma and Iyer (2011) discuss that performance pricing leads to greater interdependency and collaboration: technically performance pricing is often taking a share of customer profits instead of a fixed fee.

In second degree price discrimination customer segments or even individual customers are charged different price depending on their willingness to pay. The rationale behind this type of pricing comes from demand curve (Kotler and Keller 2008, pp. 440-441). Few are willing to pay much, but on vice versa the lower the price, the more potential customers there are. See figure 13 below.

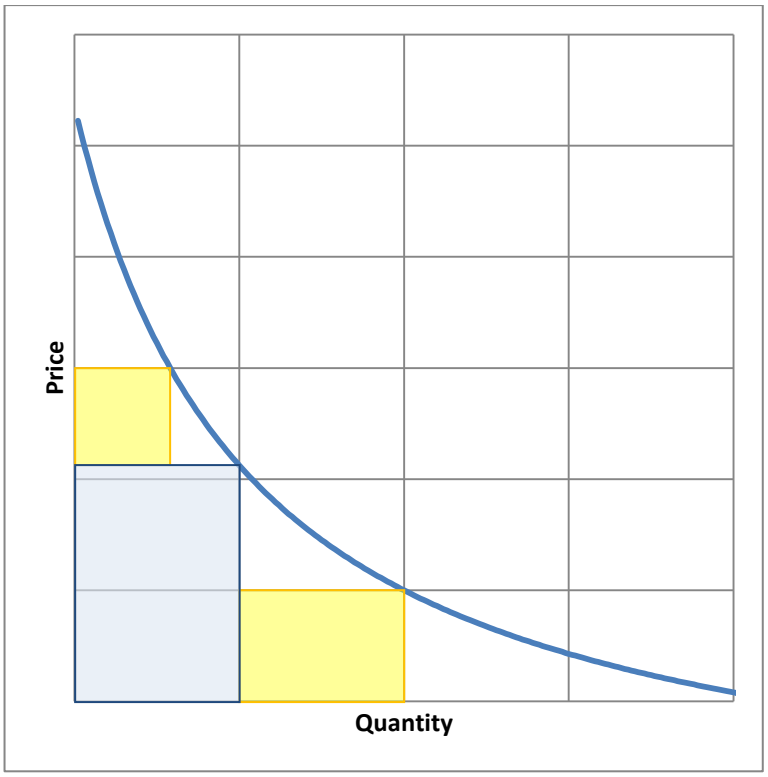

Fig. 13. *Price sensitivity of customers and getting the most out of it.*

In picture 13, there is one price to which the demand curve shows that there will be a certain number of customers. The revenue the company gets is $Quantity \times Price$ which is graphically shown as the light blue rectangle. The area of the rectangle is a bit more than 2 grid squares, but under the demand curve there are still roughly 4 squares which are not satisfied. They are not satisfied because some customers are willing to pay higher price and also there are still potential customers, but they are not willing to buy at current price level. Adding more price points gives more revenues. The yellow rectangles show extra earnings when using 3 prices. The revenues increase by 1,5 squares, totaling a 75 % increase. The offering itself is practically the same; in B2B environment premium products could be manufactured and shipped as top priority or the price might include longer warranty. Still the product costs are almost the same.

4.4. Relationship-based approach to pricing

Relationship-based pricing focuses on customers, not products as the source of income. The focus is on customer lifetime value (CLV) to the company, which is total of profits coming from purchases of the customer discounted to present value and taking into account customer acquisition cost. (Kotler and Keller 2008, p. 172). It can be argued that there would be customer retention costs as well, but in this thesis those are already included in discounted profits. Also it is recognized by Biggemann and Buttle (2011) that there are other types of value received from customer relationships besides money.

In Marketing Management book, Kotler and Keller (2008, p. 172) describe the basic mathematical concept of customer lifetime value. Customer lifetime value for a not-yet-acquired customer follows formula 20 below.

$$CLV = \sum_{t=0}^{T} \frac{(p_t - c_t)r_t}{(1+i)^t} - AC \tag{20}$$

$$p_t = price\ paid\ by\ a\ customer\ at\ time\ t$$

$$c_t = direct\ cost\ of\ servicing\ the\ customer\ at\ time\ t$$

$$i = discount\ rate\ or\ cost\ of\ capital\ for\ the\ company$$

$$r_t = probability\ of\ customer\ repeat\ buying\ at\ time\ t$$

$$AC = acquisition\ cost$$

$$T = time\ horizon\ for\ estimating\ CLV$$

The formula implies that the value of a customer can be increased by increasing customer profitability by increasing price or reducing cost of servicing. In addition it can be improved by lowering the acquisition cost or by improving the probability of customer repeat buying. If the time horizon is set to be infinite and the relation between price and cost is named margin, the CLV simplifies into following formula.

$$CLV = \sum_{t=0}^{\infty} \frac{mr_t}{(1+i)^t} - AC = m\frac{r}{i+1-r} - AC \tag{21}$$

$$m = p_t - c_t \tag{22}$$

Below is analyzed the customer lifetime value to see, which one of the four factors has highest impact on CLV. This is resolved by partial derivatives shown in formulas 21-24.

$$\frac{\partial CLV}{\partial m} = \frac{r}{i+1-r} \tag{23}$$

$$\frac{\partial CLV}{\partial r} = \frac{m(i+1)}{(i+1-r)^2} \tag{24}$$

$$\frac{\partial CLV}{\partial i} = \frac{mr}{(i+1-r)^2} \tag{25}$$

$$\frac{\partial CLV}{\partial AC} = -1 \tag{26}$$

Unlike the production function (1) described earlier in section 2, these partial derivatives aren't as easy to compare as they rely on multiple attributes. A numeric graphical presentation of variations in retention rate, margin and discount rate is shown below.

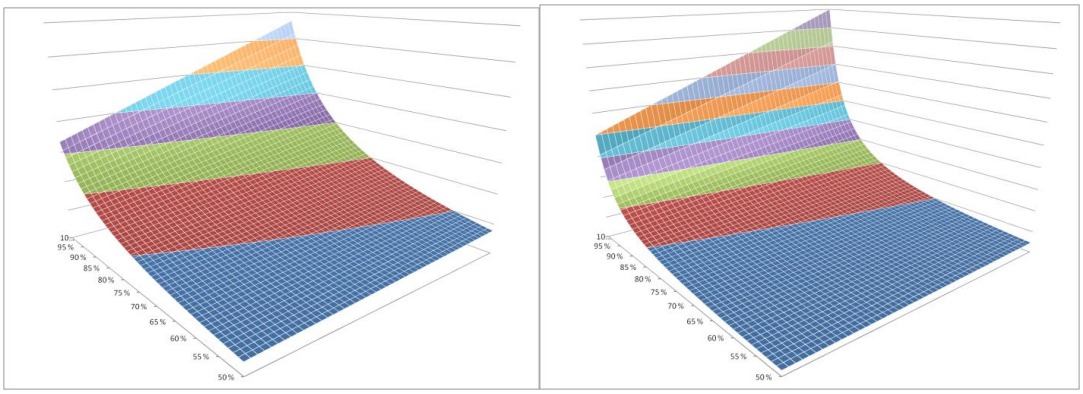

Fig 14. *Customer lifetime value by margin and retention rate. Left graph discount rate =15 %, right 5 %.*

On the left side of the base of the graph there is retention rate and on the right side, margin. The Height of the graph shows customer lifetime value. When margin increases, the customer lifetime value increases linearly. For retention rate the CLV growth is hyperbolical. Moreover, the lower the discount rate, the higher the for customer retention. Above graphs are based on absolute values of customer lifetime value. Formulas for percent changes are presented below (25-28).

$$m\frac{\partial CLV}{\partial m} = \frac{mr}{i+1-r} \tag{27}$$

$$r\frac{\partial CLV}{\partial r} = \frac{rm(i+1)}{(i+1-r)^2} \tag{28}$$

$$i\frac{\partial CLV}{\partial i} = \frac{imr}{(i+1-r)^2} \tag{29}$$

$$AC\frac{\partial CLV}{\partial AC} = -AC \tag{30}$$

It can be noticed that 1 % reduction is acquisition costs results in $0{,}01 \times AC$ increase in CLV (28). Changes in both retention rate (26) and discount rate (28) result in non-linear changes to CLV. Percent change in margin (25) results a linear change in CLV, where the margin multiplier is relative to discount rate and retention rate. The multiplier's minimum value is 0, if no customer is a repeat customer, and the highest value is $^{m}/_{i}$ for 100 % retention rate (see formula 31 below).

$$\text{If r} = 1, \text{then} \frac{mr}{1+i-r} = \frac{m}{i} \tag{31}$$

If the discount rate is within 2 – 20 % range, it results 5 to 50 times multiplier for 1 % increase of margin if customer retention rate is 100 %. 1 % improvement in retention rate is always better than 1 % margin improvement. This is shown in the comparison (32) of formulas 27 and 28.

$$\frac{mr}{i+1-r} > \frac{rm(i+1)}{(i+1-r)^2} \tag{32}$$

$$\cancel{mr} > \frac{\cancel{rm}(i+1)}{i+1-r}$$

$$i+1-r > 0, because\ 0 \leq r \leq 1\ and\ i > 0, m > 0\ assuming\ profitability$$

$$\cancel{i+1} - r > \cancel{i+1}$$

$$r < 0$$

As presented above, percent increase in retention rate results higher increase of CLV than increasing margin by one percent if company is profitable and discount rate is positive but not over 100 %. This doesn't take into account customer product portfolio, possibility for gaining new customers or company's customer portfolio's diversity. Also according to formula, the customer can create the same margin by one purchase at high profit or multiple purchases at lower margin, resulting in very different profitability and revenue numbers.

With numerical modeling, it is possible to calculate what would be a reasonable discount for a contract that has a limited duration. If the retention rate can be set to 100 % for the contract duration, it is possible to calculate how much margin can be offered as discounts or other services to the customer so that the customer CLV would remain the same. Essentially the calculation of customer lifetime value formula changes into following.

$$CLV = \sum_{t=0}^{T_c} \frac{(p_t - c_t)}{(1+i)^t} + \sum_{t=T_c}^{T_f} \frac{(p_t - c_t) r_{t-Tc}}{(1+i)^t} \tag{33}$$

The first sum of the formula 33 has 100 % retention rate, so it is only the sum of discounted yearly profits until the contract ends at time T_c. The second sum is after the contract has ended and is calculated until the end of analysis period T_f. Also the retention rate begins to affect starting from the year following the contract end. When discounted at 10 % interest rate and compared to 10 year time span, the discounts from the margin range from 5 % to 66 % keep the customer life time value at the same level

depending on original customer retention rate and duration of the contract. See picture 15 below.

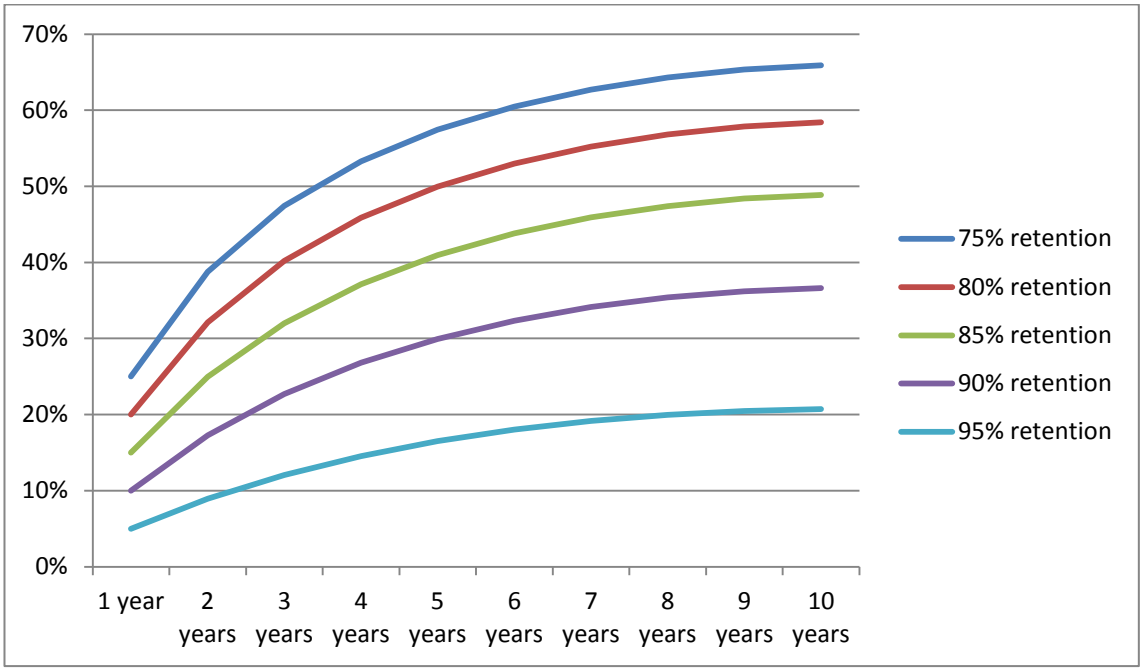

Fig. 15. *Discount of margin by contract duration and starting retention rate at 10 % discount rate compared to 10-year customer lifetime valuation without a contract.*

Picture 15 above indicates that the lower the retention rate and the longer the contract duration, the higher discounts can be afforded. To get the actual discount for the customer out of sales, the discount of margin above is multiplied with product's profit margin. So for a 15 % profit margin product, which customer usually buys for 10 000 € in year and whose customer segment has 80 % retention rate to repeat buying, a long 5 year contract could be offered at 50 % * 15 % = 7,5 % discount. Normally the customer's lifetime value would be 3 834 € and it would create revenue for 25 563 €. But now with the 5 year contract, it would create revenue for 51 097 € and the profits or customer lifetime value would be the same 0,075 * 51 097 € = 3 832 €. The small difference comes from inaccuracies in numerical calculation.

Kumar *et Al.* (2009) studied especially B2C-markets, where customer loyalty or retention rate is a business metric mined from the company data warehouses. They propose that besides looking at just customer lifetime value, it is important to look for customer's size of unused wallet (SUW) or more generally customer buying potential. The writers propose a framework, which assesses customer lifetime value and size of unused wallet together. The customer segmentation chart presented by the authors is shown below as table 1 as well as a more graphical interpretation of it as picture 16. In B2B-environment and especially the aftersales possibilities or aftersales SUW are relatively easy to measure accurately rather than resorting to the use of psychological segmentation required for B2C-markets.

Table 1. *Customer segmentation based on CLV and SUW* (Kumar *et Al.* 2009)

	Low SUW	High SUW
High CLV	Segment 1 Nurture	Segment 2 Defend
Medium CLV	Segment 3 Sustain	Segment 4 Augment
Low CLV	Segment 5 Reduce costs	Segment 6 Up-sell & Cross-sell

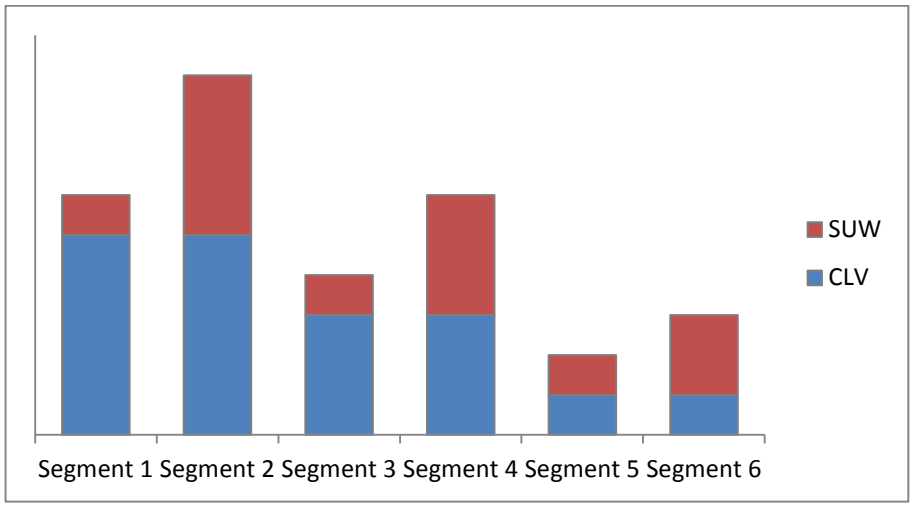

Fig. 16. *Graphic representation of customer segments based on CLV and SUW (Kumar et Al. 2009).*

Segments 1 and 2 present high future profits for the company, as shown by CLV in picture 16. The customers in segment 1 though cannot provide much more profits than they are providing now. The relationship should be nurtured and maintained. In the article the writers present tangible or intangible rewards for loyalty of these customers. Segment two has growth potential left and these already very profitable customers could provide more for the company. These customers are also more competed and require more defending. Marketing objective should be in retaining and augmenting the customer lifetime value. (Kumar *et Al.* 2009)

Segments 3 and 4 are midrange customers and most of the company customer base comprises of these. Segment 3 customers cannot grow much and marketing efforts

shouldn't focus on them. They are not worth enough for special attention like segment 1 is. Segment 4 on the other hand should receive attention as there is much to be gained through up-selling and cross-selling initiatives. If the customer doesn't respond well to the marketing initiatives, maybe reducing costs incurred by these customers is a more profitable way. (Kumar *et Al.* 2009)

Final segments 5 and 6 have low CLV and they can be perceived as draining company resources. For segment 6 selling more through up-selling and cross-selling could provide additional profits and increase the customer lifetime value. For segment 5 which cannot get much bigger in terms of CLV the best option is to reduce transaction and other costs incurred by the customer, for example by automating repeat purchases through Internet. (Kumar *et Al.* 2009.)

Not all customer value is measured in money. As mentioned at the beginning of this section, Biggemann and Buttle (2011) researched how companies value their customer relationships. In their multiple case study, they studied in total 15 companies in different industrial sectors, but all in B2B-environment. They propose a model of 4 dimensions of relationship value which is later segmented into 11 sub-dimensions. See picture below.

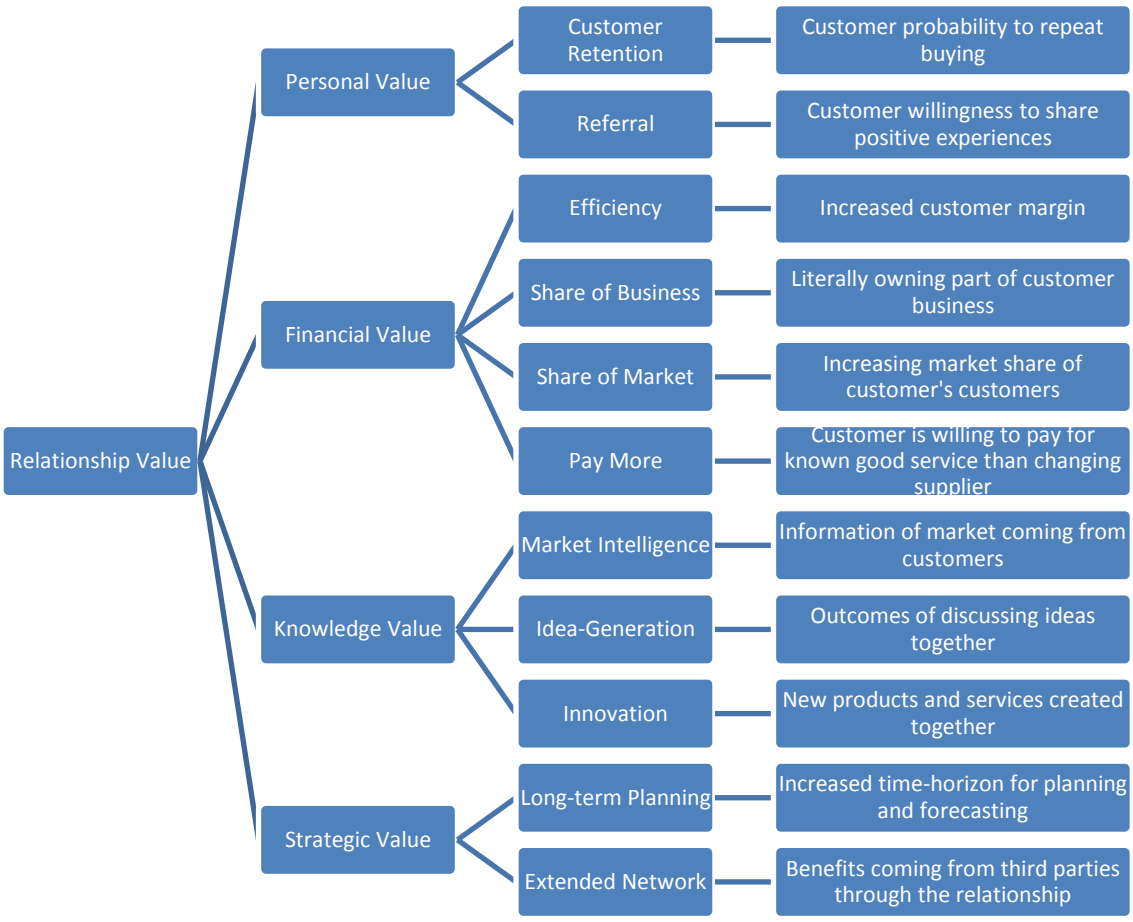

Fig. 17. *Dimensions of customer relationship value (Biggemann and Buttle 2011).*

As can be seen from the picture 17, only two of the 11 sub-dimensions in Biggemann and Buttle's (2011) framework can be assessed with customer lifetime value, "customer retention" and "pay more". All the other dimensions of customer value are invisible to CLV calculations or they might influence it in some non-direct way. The framework presented is a new exploratory study, so there might be more dimensions that come out after further analysis. Most importantly pure cost and revenue analysis cannot give complete picture of customer value and thus customer pricing always needs to have a qualitative component.

4.5. Segmentation

Prices can be set separately for each customer segment (Kotler and Keller 2008, p. 441). The authors list that segments should meet five criteria: they ought to be measurable, substantial, accessible, differentiable and actionable. The purchasing power and other characteristics of the segment should be able to be measured and when measured, the segment should be large and profitable enough to serve. They should be reached so that they could be served. The segments should be different from each other so that they can be targeted. Effective marketing programs can be made for attracting and serving the customers in a segment. (Kotler and Keller 2008, p. 268)

(Kotler and Keller 2008, pp. 266-269) provide the basics for segmentation also for business markets. They cite Bonoma and Shapiro (1983) for a list of seventeen major segmentation variables for business markets which are listed below. They also mention that certain segments can have specific products linked to them forming a matrix. In customer profitability analysis (Kotler ja Keller 2008, p. 171) they link the matrix to product profitability resulting a segment profitability, see illustration further below.

- Demographic variables
    - Industry: Which industries should we serve?
    - Company size: What size companies should we serve?
    - Location: What geographical areas should we serve?
- Operating variables
    - Technology: What customer technologies should we focus on?
    - User or nonuser status: Should we serve heavy users, light users or nonusers?
    - Customer capabilities: Should we serve customers needing many or few services?
- Purchasing approaches
    - Purchasing-function organization: Should we serve companies with highly centralized or decentralized purchasing organization?
    - Power structure: Should we serve companies that are engineering dominated, financially dominated and so on?
    - Nature of existing relationship: Should we serve companies that prefer leasing? Service contract? Systems purchases? Sealed bidding?

  - Purchasing criteria: Should we serve companies that are seeking quality? Service? Price?
- Situational factors
  - Urgency: Should we serve companies that need quick and sudden delivery or service?
  - Specific application: Should we focus on certain application of our product rather than all applications?
  - Size of order: Should we focus on large or small orders?
- Personal characteristics
  - Buyer-seller similarity: Should we serve companies whose people and values are similar to ours?
  - Attitude towards risk: Should we serve risk-taking or risk-avoiding customers?
  - Loyalty: Should we serve customers that show high loyalty to their suppliers?

From pricing point of view Kotler and Keller (2008, pp. 440-441) mention that price discrimination can be based on customer's demand, it can be based on purchase volumes and it can be based on customer segment. They also mention that pricing can vary because of product image, channel, location and even time. Also yield pricing is mentioned where early purchases for a product to be received later receive discounts compared to products that need to be delivered quickly.

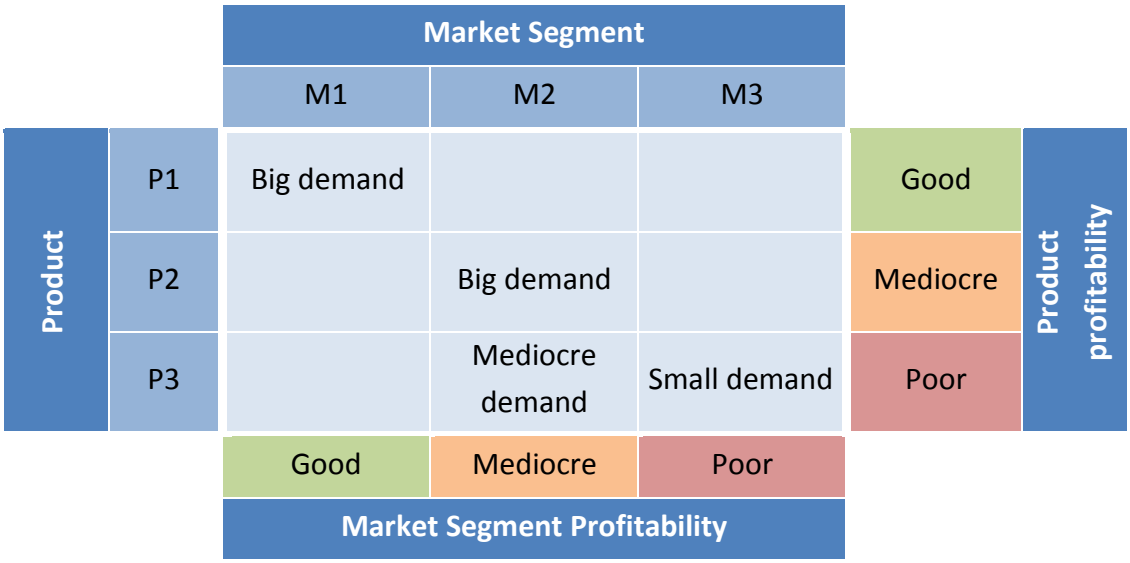

Fig 18. *Customer segmentation matrix adopted from* (Kotler and Keller 2008, p. 171)

In the matrix above, customers in market segment M1 are targeted with highly profitable products P1. Market segment M2 is considered to be more interested in product types P2 and P3. Lastly market segment M3 is interested just in product type P3, which makes it the least attractive customer segment. The market segment profitability is calculated based on the product profitability of those products they would buy. Intuitively serving only segments M1 and M2 would be feasible, although there can be other strategic implications why serving segment M3 is worthwhile in the long run.

Segment needs to be large enough to serve. To know if the segment is large enough in the future, demand forecasts are needed. Kotler and Keller (2008, pp. 149-156) explain briefly the terms and basic principles of demand. Term "available market" is used for total market with customers having interest, income, access and qualification for a particular market offer. "Target market" is the segment targeted by company and "penetrated market" is the amount of customers that are buying from the company. Market demand is calculated using target market. In business markets the market share is calculated against the sales of defined competitors. Forecasting demand can happen by surveying buyers' intentions, ask sales force for opinions, have expert opinions for example from third parties, or analyze past sales data.

A study by Lackman (2007) claimed better forecast accuracy than buyer-intention-survey based forecasts or typical B2B forecasts. The study was based on car component demand and took into account the quality of the measured product and the quality of competitors' products measured by consumers, expenditures on marketing, specifically direct selling, advertising and sales promotion separately measured by constant dollar outlay, measured product's price and competing products' prices. These can be summed together under three of the marketing's "four Ps", namely product, price and promotion. The author's demand formula also took into account real US disposable income and real US consumption of cars as exogenous variables. The author lists a set of limitations to the formula. One is that the product life cycle can affect the weights of attributes, namely increasing the weight of price. He also mentions that differences between customers in price sensitivity and valuation of product attributes. In addition different industries and typical supply chain structures can affect the formula. For these limitations the regression coefficients vary between products and markets which mean that the formula needs to be reapplied to all product and market combinations. The formula is presented below (34).

$$Q_t = a + b_1 Pr_{it} - b_2 Pr_{jt} + b_3 Ns_t + b_4 Ad_t + b_5 SP - b_6 P_{it} + b_7 P_{jt} + b_8 Yd_t + b_9 Ca_t + e \quad (34)$$

Q_t is demanded quantity at time t. a is a constant resembling basic demand. b is the weight for each variable and calculated from historical data using linear regression analysis. Pr_{it} is company's own product rating, Pr_{jt} is the overall rating of product attributes for competitors' products. Ns_t, Ad_t, $and\ SP$ are direct selling, advertising and sales promotion. $P_{it}\ and\ P_{jt}$ are product price of company's own product and competitors' average price. Yd is the real US disposable income and Ca is the consumption of cars. e is the error term. (Lackman 2007.)

Lackman (2007) found out that advertising has double effect; it affects sales of the current period but also the sales one period ahead. Direct selling effects only current period and sales promotion only affects one period ahead. Most important part of the formula is that it is simple, data for it can be obtained rather easily and it is accurate

enough. In the test case it showed 8,5 % mean average error over 3-year time horizon. Importantly the exogenous variables depicting customers' target market's total size (US disposable income) and historical consumption of customers' customers didn't have the smallest weights.

Lackman's article can be used in conjunction of the customer segmentation matrix. It gives good relation for price and demanded quantity which directly forecasts revenues and profit. It also takes into account competing products, amount used for marketing and the well-being of customers' customers.

4.5.1. Global Pricing

Geographic area can be a segmentation variable. Kotler and Keller (2008, p. 253) Pricing can be problematic in global market which is explained briefly in Kotler and Keller (2008, pp. 655-657). The authors say that the price escalation becomes a problem as freight, taxes and other tariffs, and possibly importer and distributor margins are added to product price in manufacturing country. The authors have three solutions to this, where one is to have same price everywhere, second is to have market-based price, which in this case can be either value-based or competition-based and the last option is to set a cost-based price in each country. It must be noted that in market-based pricing, there can be a set of intermediaries in low-price countries buying the product and shipping and reselling it in high-price countries creating a gray market which will hurt the company profitability. Managing the price differences and unauthorized sales is very important. Also changes in currency exchange rates can pose problems.

Cavusgil (1996) studied global pricing and established a framework where five factors need to be addressed for setting a price in a foreign country. According to the author, these five factors are the most important of all the possible factors. They are nature of the product or industry, location of production facility, distribution system, location and environment of the foreign market and finally foreign currency differentials.

Nature of the product or industry has a set of variables inside the vague description: Product or service specialization and technological edge, local competition, global competition in target region, import barriers, and fluctuations in raw material prices and supply. The more differentiable and specialized product is, the higher price can be charged. Local competition has edge over global competition as local competition doesn't need to pay possible import duties or other tariffs or freights. Fluctuation in raw materials affects the whole industry. (Cavusgil 1996.)

Location of production facilities sets the basic price for freights. Also a local incident like natural disaster or a political trade embargo might affect the production facility, but not the demand in target country or the competition there which can change the competition quickly. A multinational company with many production facilities enjoys

possibility to calibrate production volumes and possibly respond to foreign exchange fluctuations. (Cavusgil 1996.)

Distribution system describes company's control to the final price. Own subsidiaries can be controlled more tightly than third party distributors. Also, the number of intermediaries effect the end price as each intermediary wants their part of the profit. (Cavusgil 1996.)

In the target country, the product offering might not work as intended and it would need some modifications to local conditions. The modifications typically cost money and that needs to be taken into account when planning prices and production. (Cavusgil 1996.)

Currency differentials, inflation and price controls may hinder market entry and effectiveness. Cavusgil (1996) lists that when domestic currency is weak, then price in target country can be low compared to local competition. The article continues that such exchange rate position is exploited well when more costly features can be added to product, sourcing and manufacturing should be domestic, export possibilities should be exploited, expenditures should be minimized in local currency and foreign customer should be billed in their own currency. On the other hand when domestic currency is strong, the opposite should be done: marketing should focus on value delivered instead of price, productivity should be improved and costs reduced, sourcing and manufacturing should be shifted overseas, priority should be given to customers who are in countries with relatively strong currencies, maximize expenditures in local currency and foreign customers should be billed in domestic currency.

There are differences in corporate cultures in foreign countries. The differences can come from utilization of technology, differences in negotiation methods and tactics, value of ethics or something as precise as typical payment terms employed. These can affect profitability and system control in unexpected ways unless they are analyzed beforehand.

4.5.2. Global Pricing Contracts

A multinational company can source some of its purchases for all or many of its locations from one supplier instead of all the locations do their own sourcing. For a big, multinational customer, a global pricing contract (GPC) can improve operations efficiencies. For example it can ease product development and inbound logistics. For big multinational suppliers GPCs can provide a predictable flow of business, eliminate competition and tighten customer relationships. Narayandas *et Al.* (2000) explore these contracts in their article. They argue that even though one customer is expected to be similar everywhere, it probably isn't. This can result in unprofitable deals and unforeseen demand structure. They recommend to inspect if the customer buys different products in each market it is active in, to define the competitive intensity in those markets, and to take into account customer's purchase patterns across markets. They

also suggest that the supplier studies its own market power across markets, check channels of distribution across markets and finally investigates the cost structures in discussed markets.

Referring to previously discussed customer segmentation matrix, picture 18, one multinational customer can be a poorly profitable customer in one market, but highly profitable in another market. The total benefit of globally fixed prices for a multinational company needs to be tested and simulated carefully to avoid running in trouble. Narayandas *et Al.* (2000) list also, that for a GPC to be successful, the customer's top management needs to be supportive for the contract, systematic implementation in local and global level needs to be underway, local markets must resemble each other, customer is more interested in value increase than cost reductions, products and services account for a significant proportion of customer's total purchases and finally supplier needs to have established working relationships with customer's local managers.

5. PRICE REALIZATION AND CONTROL

After price setting, price realization is the other axis of pricing capability as explained earlier in section 3. Hunt and Saunders (2008) explored the pricing process maturity and presented a 5-level roadmap to world class pricing. The roadmap is pictured below.

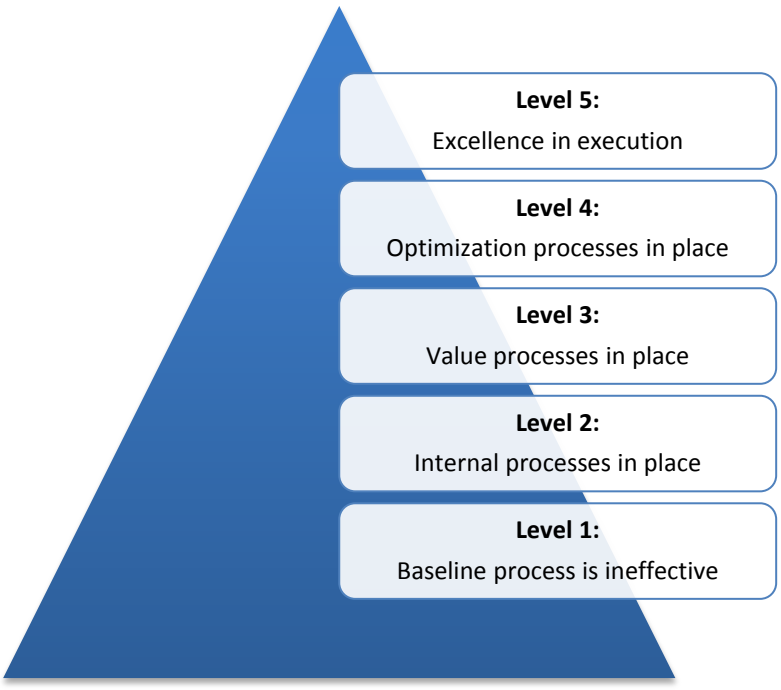

Fig 19. *World class pricing process maturity according to Hunt and Saunders (2008).*

Hunt and Saunders (2008) describe the five levels as being the necessary steps which need to be taken at that order to reach world class pricing excellence. In the first level, pricing is highly reactive and sales department dominates pricing decisions. The sales department threats pricing with lost deals and unhappy customers which leads to discounting. The prices are set by few experienced individuals relying on personal experience. The pricing function usually just manages the price lists and reacts to the array of demands. To evolve into second level pricing organization, the process needs to be gained in control.

The second level pricing function sets policies and enforces control. There are analysis tools and process guidelines that help structuring pricing. Hunt and Saunders (2008) also describe that sales department usually perceives the rules as too strict and prohibiting for sales. Compensation for sales personnel is based on profits, not revenues. Six sigma methods are used to gain control of pricing; they are discussed in

depth later. Focus of this phase is internal analysis on sales. To reach third level, deep understanding of product value is needed.

Hunt and Saunders (2008) describe the third level as customer-driven pricing. At this level, the organization conducts price sensitivity researches to learn what customer value and how much they are willing to pay for different products. Pricing is done on basis of these data obtained from customer research and the pricing decisions are done through negotiation with marketing and finance departments. Pricing also seeks to connect pricing decisions with corporate strategy which will require the pricing function to be besides highly analytical, but also a strategic thinker. A step to level four pricing process requires utilization of optimization, anticipation of customer reactions and precise measurement of price elasticity.

Hunt and Saunders (2008) tell that the key phrases are profit optimization and price elasticity at level 4 pricing process. Pricing research is done with specialty software. Pricing is typically led by a Vice-President of Pricing or a Chief Pricing Officer (CPO), who has significant authority with respect to pricing and typically reports directly to company CEO. Pricing research is not about statistics, but rather "bringing data to life", so that it tells a story about the customer, market and competition. There is a pricing culture in the company and pricing function trains sales and marketing about pricing.

The last level is a pricing mastery level to which the authors have set a strict criteria: pricing is seen as strategic capability, level 4 performance is maintained for at least two years, company achieves substantially superior business results, and new products are designed to price. IKEA is mentioned as a pricing master. (Hunt and Saunders 2008.)

The roadmap by Hunt and Saunders (2008) complies well with matrix of Hinterhuber and Liozu (2012) which was described earlier in section 3. Although the Hunt and Saunders (2008) include the change from cost-based approach to pricing to value-based approach, their roadmap seems to stretch further than the matrix. See graphical representation below.

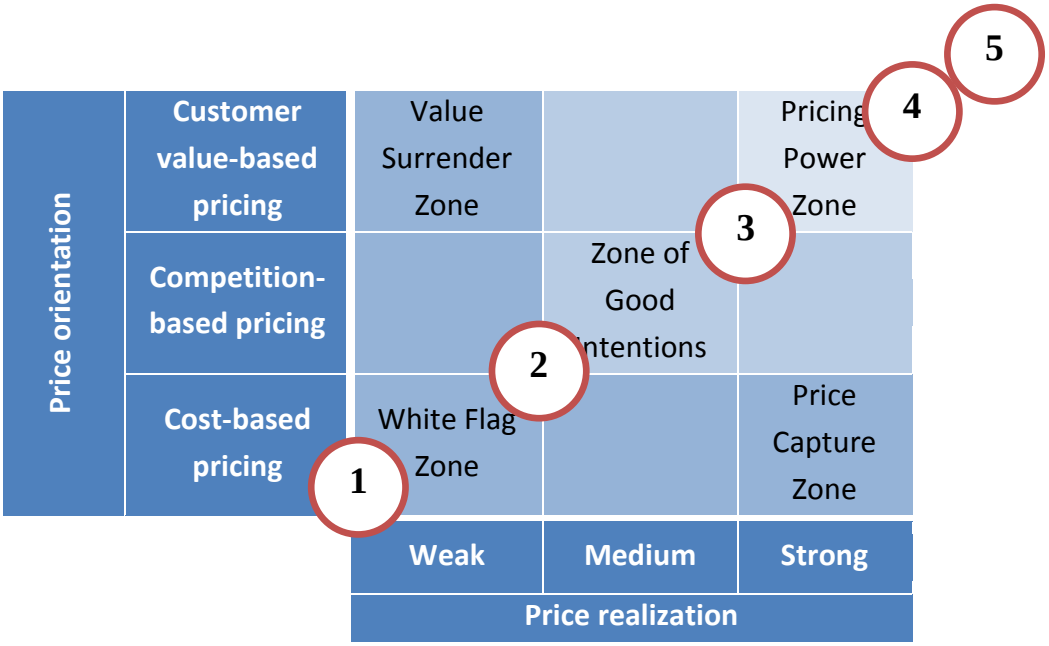

Fig. 20. *Hunt and Saunders (2008) roadmap in relation to Hinterhuber and Liozu (2012) matrix.*

In the following sections, pricing control and analysis methods are discussed according to the roadmap presented above. Different techniques are placed to the corresponding step in Hunt and Saunders (2008) framework based on the level descriptions provided. Emphasis is on 2nd and 3rd levels as those are more relevant for the case company and this thesis.

5.1. Gaining internal process in control

Usually the end of price setting process isn't one fixed price, but rather a pricing structure, that takes into account geographical area, market segment, purchase timing, order levels, delivery frequency, guarantees, service contracts, and other factors. The company rarely realizes the same profit from each unit it sells. (Kotler and Keller 2008, p. 437.)

Sales personnel do not always sell at set price level. Instead, they might treat a list price, or the output of a pricing algorithm as just the starting value for negotiations (Hinterhuber 2008, pp. 433-434). A rationale for giving additional discounts might be that the sales person receives bonus based on revenues. Following the numbers presented earlier, an average company with 70 % variable costs, 21 % fixed costs and 9 % profit for a product, the sales person might easily give a 5 % discount to close the

deal. It will reduce the salesperson's bonus only by 5 %, but it will hurt company profitability by 60 %. (Marn and Rosiello 1992.)

Sodhi and Sodhi (2005) in their Harvard Business Review article describe, how six-sigma tools were used in a case company that was facing increased costs and which had resource-consuming price-setting process between sales and pricing departments not to mention sales personnel selling under agreed price. In the article the authors describe the use of six-sigma model DMAIC, which is an acronym standing for Define, Measure, Analysis, Improve and Control. In define phase, the project's problem is clarified in such a way that measurable goals can be achieved within a few months. In the second step, data is gathered for further analysis; usually process is imaged and diagrammed for a high-level picture. When the process has been mapped and documented, and hard data has been verified, analysis is done. There are a myriad of six-sigma tools for each of the phases, including analysis. Improvement phase is about giving recommendations for change based on the analysis done earlier. Final phase is control, which enables the company to sustain and extend the improvements.

Frank (2003) describes, that besides DMAIC, also DMADV framework can be used. DMADV is otherwise the same as DMAIC, except that the final two phases are design and verify. It is used for bigger and more radical changes or for designing new processes altogether. For this thesis though, only DMAIC is considered as in the case company, an existing pricing process is in place. Next five subchapters describe the phases of DMAIC focusing on tools to be employed in each phase.

5.1.1. Define

Sodhi and Sodhi (2007, p. 150 & pp. 155-156) describe that during project definition phase, it is necessary to define the problem: what constitutes a defect and how severe the problem is. Then those problems are linked to business goals or customer requirements. Here customer refers to the entity that states the requirements of the products. Project scope must be clear and not too big to handle effectively. The project should have an estimation of project end benefits, goal statement with measureable targets and analysis done on barriers to success that might inhibit the project success. The authors suggest drawing a high-level process map of the pricing process so that the team knows the basics of the process, get visual boundary regarding project scope. Zornig suggests to use critical to quality (CTQ) tree already in the define phase, so the actual problem can be split into identifiable and measureable sub-problems. (Zornig 2006.) See picture 21 on next page.

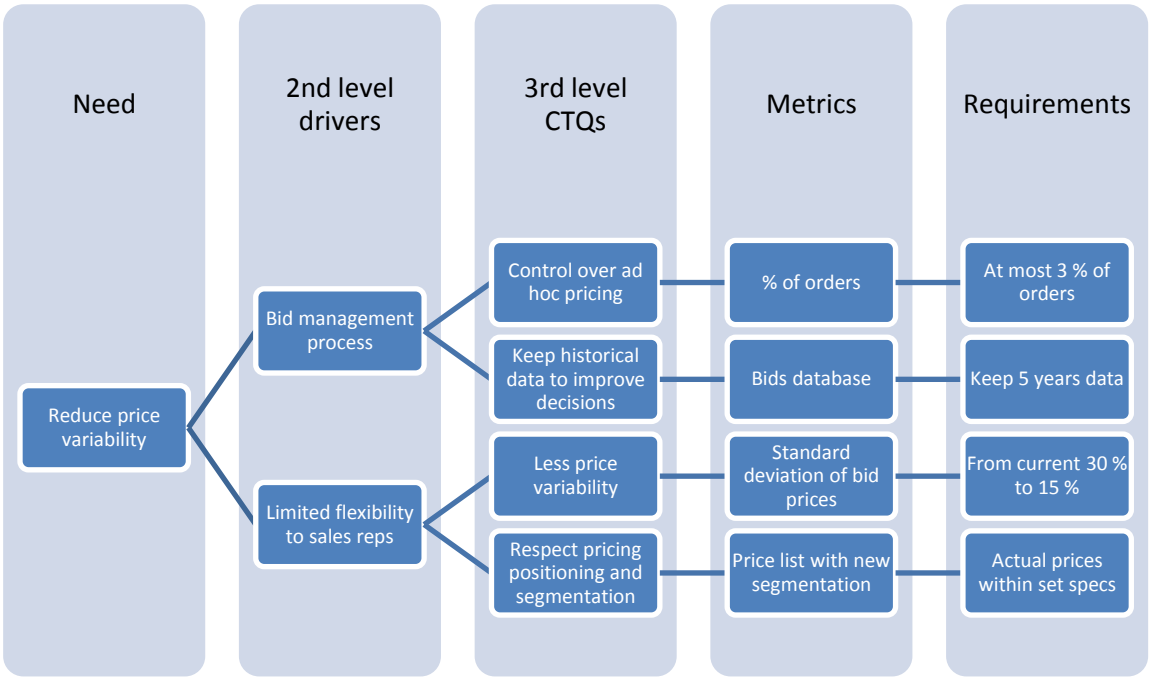

Fig. 21. *Part of a critical to quality tree to reduce price variability according to Zornig (2006).*

In the picture 21 above, price variability has been chosen to be improved. It was assessed that bid management process and sales representatives' flexibility have big impact on that variability. Those were further defined at 3rd level and metrics were chosen to make the objectives quantifiable. Then target level was set on the requirement column.

Frank (2003) explains that the output defects of pricing process are related to following. Pricing ownership is distributed and policies are inconsistent, deals are negotiated outside corporate pricing policies and the resulting deals are won with little or no margin. He lists that a significant number of deals are lost on price and those that are won have a large price variance for similar products for similar customers. The author also lists that customers with different business value are all charged the same for similar products and there is a large amount of reclamations because of pricing disputes.

5.1.2. Measure

Measure phase has two activities. First to develop a detailed process map of the "as-is" process and to identify collect and validate the data to be used in analyze phase later. Basic idea is that when the output defect is defined, it is possible to analyze the outputs with enough variables or settings of each input so that each input can be related to a specific effect on the output which is done in the analyze phase. The authors identify two tools for this phase to focus on getting workable data for the rest of the project. These are SIPOC which is defined in paragraphs below and Design of Experiments,

which are defined in paragraphs below. (Sodhi and Sodhi 2007, pp. 113-116 & pp. 168-169)

SIPOC is an acronym meaning supplier, inputs, process, outputs and customer. It is a table structure where each phase of a process is listed with the inputs the process receives from where it receives them and similarly which outputs are produced and for who. The table can also include information whether certain inputs are in control or can it be made to work easily. (Sodhi and Sodhi 2007, pp. 114-115.) Improvement Skills Consulting Ltd. (2008) describes SIPOC a bit more and includes process phases, process owner, process name and purpose as well as process boundaries into the table. See table 2 below for an example.

Table 2. *Example SIPOC table based on template from Improvement Skills Consulting Ltd (2008).*

Price setting process						
Owner				Pricing management team		
Purpose				Set prices for products		
Step	**Supplier**	**Input**	**In control**	**Process**	**Output**	**Customer**
1	Product lines	Product cost structure	C	Refine variable costs and required product margin	Minimum sustain-nable price	Sales, marketing
2	Sales reps	Market competition	U	Define price level of similar competing products	Establish base price level	
3	External market study	Customer value perceptions	C	Understand customer value drivers	Weights for value drivers	
4	External market study	Competing product value	U	How good competitior products are when measured with value drivers	Compe-titor's compe-titive prices	
5	Product lines	Product value proposition	U	How good product is when measured with value drivers	Price list for products	
Process includes: • Standard spare parts • Standardized aftersales service • Product lines A, B and C					**Process start** • Yearly, starting on second Monday of January	
Process does not include: • Whole main products • Non-standard parts or service • Product lines D and E					**Process end** • Published price lists for sales reps' use on August 1st.	

The example table in the previous page describes an imaginary pricing process for spare parts in multiple market area and multiple product line environment. Steps tell the phases of the price setting process in some order, and the end products of those steps are listed even though they are just used for the next step. The end result of the fifth step is the price list which is distributed to sales and marketing. In control options C and U denote whether the process phase is in control (C) or not (U). In the example sales representatives' view on the market competition is seen biased because of conflicting goals, representatives are expected to say competition is higher than it actually is and besides the bias, the precise measurement of competition intensity is difficult. Costs on the other hand can be accurately measured and market studies on customer value perceptions can provide accurate data through conjoint (tradeoff) analysis or other methods. Unfortunately even well segmented customers have variance in their product requirements and they perceive value differently, thus the good estimation for value is still perceived as not in control. Process boundaries are listed as well for clarity. They also make it possible to see if the pricing management team is overstretched if there are multiple simultaneous projects.

Design for experiments is a way for getting information how changes in process inputs show in process outputs. When multiple inputs are modified simultaneously, their interaction effects can also be measured from the changes in process output. Related to pricing, the need for actual experiments is small, as companies can readily have adequate data from invoices already. (Sodhi and Sodhi 2007, pp. 114-116). Sodhi and Sodhi also underline that data validation is necessary and important step during the measurement phase. Especially data in computers is prone to errors according to them. They see that the main purpose for inaccuracies in data is that the persons inputting data to the system beat restrictions and enter whatever just to get the job done. (Sodhi and Sodhi 2007, p. 175)

5.1.3. Analyze

Sodhi and Sodhi divide the tools for analysis phase into process analysis tools, root-cause analysis tools and data analysis tools. Many of the tools predate six-sigma, but are rather adopted because they fit the purpose. That also means there are many tools and not all of them need to be used. The authors suggest that any approach that the user is comfortable works. (Sodhi and Sodhi 2007, pp. 116-117.) Process analysis tools discussed below are cause and effect matrix, failure mode and effects analysis (FMEA) and value stream analysis. After process analysis tools, root-cause analysis is explained and finally data analysis tools are explained.

Cause and effect matrix is a systematic way to quantify impact of each step in the current process based on customer requirements. It basically extends the SIPOC table

for studying the inputs and their effects to the end product valuated by the process customer. Also the valuation is divided into elements and each of those are valuated separately for each step. Each element are multiplied together to create a priorization order of the inputs. (Sodhi and Sodhi 2007, p. 117) Table 3 below further explains the matrix. The example process is the same as in the SIPOC tool explanation above.

Table 3. *Example cause and effect matrix modeled after Sodhi and Sodhi (2007, p. 118)*

			Customer requi-rements	Market share	Profitability	Pricing simplicit
			Importance	**9**	**7**	**6**
Step	**Input**	**Process**	**Output**	Below the numbers show how much impact inputs have to customer requirements above		**Total importance**
1	Product cost structure	Refine variable costs and required product margin	Minimum sustainable price	2	10	2	**100**
2	Market competition	Define price level of similar competing products	Establish base price level	10	2	5	**134**
3	Customer value perceptions	Understand customer value drivers	Weights for value drivers	8	8	5	**158**
4	Competing product value	How good competitior products are when measured with value drivers	Compe-titor's competitive prices	10	2	2	**116**
5	Product value proposition	How good product is when measured with value drivers	Price list for products	10	9	8	**201**

The numbers in the example table 3 above should be importance ratings from 1 to 10 based on team's judgment to avoid personal biases. Actual statistical data can be used to further argument for an importance rating. Customer requirements and their importance are information gathered from the customer of the process, here sales and marketing departments. On the right the importance rating of an input to customer requirement is multiplied with customer's importance rating and these are summed together for each process phase or input to calculate a total importance rating. Phases or inputs with the highest importance are those that should be focused on in further analysis and later DMAIC steps. (Sodhi and Sodhi 2007, pp. 117-118.)

Failure modes and effects analysis FMEA is a similar tool than cause and effect matrix, except that it lists possible problems, their effects and their causes and tries to assess which are the most severe problems that should be investigated more. It can be used to further assess the process described in SIPOC. Each possible problem is named and linked to a process phase or process input. Then the process is assessed by how negative effects problem causes, how common the problem is and lastly how reliably it can be identified. Each of these are given a number through teamwork from 1 to 10 where 1 is least concern or uncommon or easily detected and 10 signifies severe effects or it is very common or it is very difficult to detect. In the table 4 below imaginary problems are rated as an example using the table as formatted by Sodhi and Sodhi. (Sodhi and Sodhi 2007, pp. 118-120.)

Table 4. *Failure modes and effects matrix according to Sodhi and Sodhi (2007, p. 119)*

Process step / input	Potential failure mode	Potential failure effects	Severity	Potential causes	Occurrence	Current controls	Detectability	Risk priority number	Recommended actions
1 / product cost struc-ture	Data misinter-pretation	Too low margin with little volume gain	10	User error: wrong tool used	5	None	8	400	Clearly specified tools and their purposes
1/ product cost struc-ture	Incorrect cost data	Too low margin or too high price resulting profit loss	8	User error: typo, or other error when data inputted	6	Will show up as exceptiona lly high/low cost	3	144	
1/ product cost struc-ture	Fixed costs are divided to products in non-standar-dized way	Too low price or too high margin	9	Different corporate cultures, no unified system	10	Pricing based on variable costs	5	450	Validate and restructure all fixed cost elements away

In the example FMEA table above focusing only at the first step of the SIPOC example earlier, three sources of potential failure modes in cost data and its analysis are presented. Each potential failure mode is described and numerical value for severity, occurrence and detectability are given from 1 to 10. With the example numbers above, it would be most important to focus on having standardized cost data regarding fixed costs so that the base price level can be calculated reliably.

Value stream analysis comes from Lean manufacturing ideology. Its focus is to identify process steps that add value and those that don't. Then those steps that don't add value are tried to eliminate. Not all non-value adding activities should be eliminated though, they can be controls, inspections and research on past data which might reduce mistakes and enforce process quality. This type of analysis can find process phases that can be seen as waste and be eliminated. (Sodhi and Sodhi, Six Sigma Pricing 2007, pp. 120-121.)

The only root cause analysis Sodhi and Sodhi explain in their book is the fishbone diagram or Ishikawa analysis. The head of the fish is the main question or problems and the bones sticking to that are first-level causes for it. The first-level causes can have second-level causes leading to them. The authors suggest to consider whether to use following themes for first level causes that are used in manufacturing: machine, methods, measurement, nature, people and materials or whether to use stakeholder functions as categorization. The root cause can be found from fishbone diagram in three different ways: one is to find which second-level causes show up frequently in the diagram, second is to seek real data based on a sample of actual defects and to investigate, what was the root cause of those and lastly the third way is voting by the team. (Sodhi and Sodhi 2007, pp. 121-123) An example fishbone diagram is presented below as picture 22.

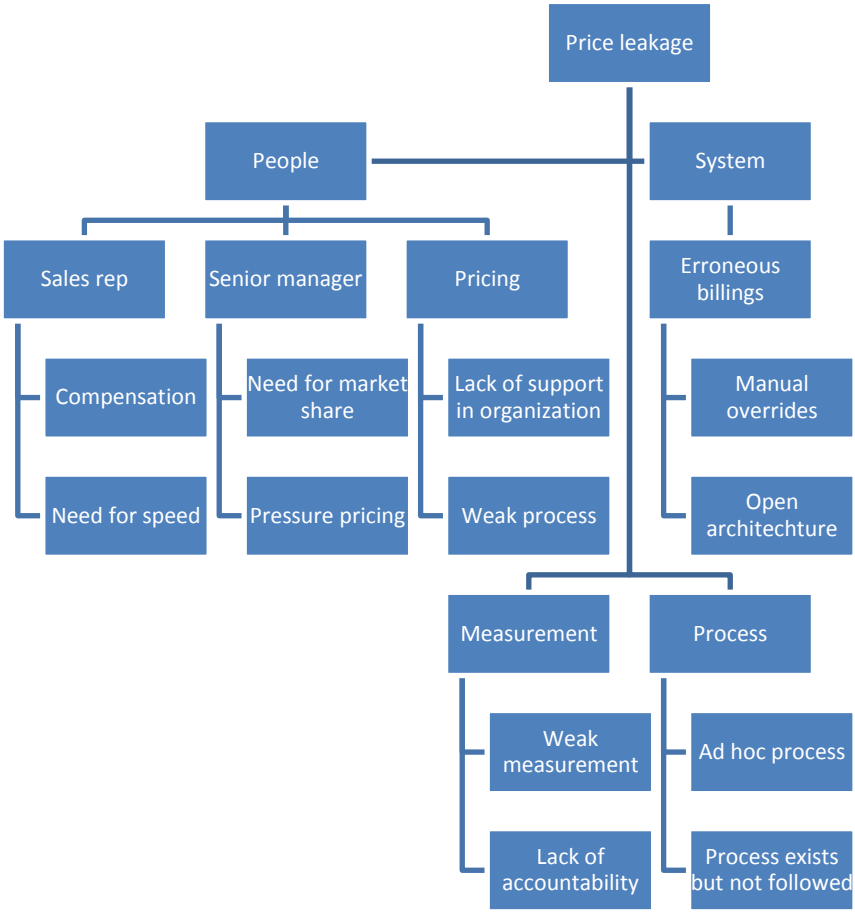

Fig. 22. *Example of fishbone diagram after (Sodhi and Sodhi 2007, p. 122)*

In the example fishbone diagram 22 above, price leakage or the discount from list price is set as the main problem. Four categories are identified leading to the problem. They are named people, system, measurement and process. People branch has the most second level causes. For example the compensation policy for sales representatives can offer better benefits based on revenue than on profitability which would be an incentive for them to give discounts to customers.

Data analysis is a set of statistics tests. Sodhi and Sodhi suggest using following framework depending on the nature of variables and nature of inputs. According to them a different tool should be selected depending whether the output is discreet or continuous and same for input data. Authors describe that when the output effect is continuous like leakage in currency or total revenue but the inputs are discrete like market area or sales rep, then analysis of variance (ANOVA) should be used. If the inputs are continuous, regression analysis should be used. If the output is discrete for example a faulty invoice or incorrect price, then for discrete inputs cross tabulation should be used and for continuous inputs, logistic regression (also logit regression). Refer to table 5 below. (Sodhi and Sodhi 2007, 123-124)

Table 5. *Statistical technique to use depending on input and output variables according to Sodhi and Sodhi (2007, p. 124)*

	Discrete inputs	Continuous inputs
Discrete outputs	Cross tabulation	Logit regression
Continuous outputs	ANOVA	Multiple regression

Since pricing related outputs are usually continuous, only ANOVA and multiple regression are discussed further from the methods mentioned. Analysis of variance explains if different inputs are meaningful for the end value or not; it answers whether the inputs are actually part of the same distribution rather than two separate distributions. It could show if discounts are bigger in certain region compared to other regions. Also it is possible to make continuous input a discreet input to analyze it with ANOVA by separating the continuous values like discount into fixed categories like discount less than 5 %, discount between 5 % and 10 % and discount more than 10 %. (Sodhi and Sodhi 2007, pp. 124-125)

Regression analysis is good for continuous inputs. Linear regression tries to create a straight line through the data points in such way that the total distance from data points to the line is the lowest. It answers to questions like if price increases by 10 euros, how big effect does it have on discounts. (Sodhi and Sodhi 2007, p. 126) Although Sodhi and Sodhi are steadfast about not using linear regression for discrete inputs (Sodhi and Sodhi 2007, p. 126), it is possible and gives better results and deeper understanding to the variables (Yhteiskuntatieteellinen tietoarkisto 2008). The regression analysis has limitations though. It always assumes there is a linear trend, although sometimes there isn't and it is prone to stray data points far away from the regression line. Three other limitations are heteroscedasticity, multicolinearity and error term correlation with time.

The first means that the error term correlates with input term i.e. the higher the input term value, the more there is error. Multicolinearity is a problem where two inputs are highly correlated, which can lead to inaccurate results. Finally the error terms shouldn't correlate between different time samples which might be the case if the observed phenomenon is affected by previous time period. (Yhteiskuntatieteellinen tietoarkisto 2008)

Besides the highly statistical methods for analyzing the data, sometimes simple graphs can tell much about possible correlations of inputs and outputs and point out problem areas. (Sodhi and Sodhi 2007, pp. 125-126) explain the use of scatter plots. Other authors have discussed those and other specified graphs as well for finding the source of leakage.

Price band shows the variety of prices the same product has depending on the occasion. Price can vary based on customer, sales representative, and time to name a few. In the picture 23 below one representation of a price band is shown.

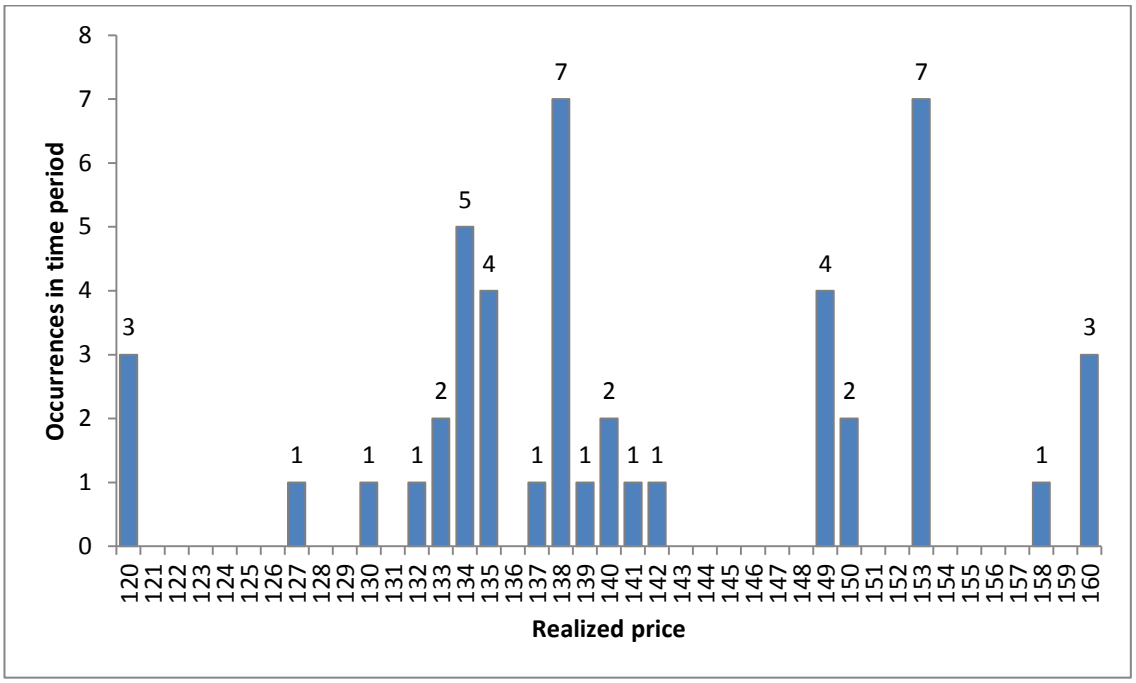

Fig. 23. *Price band of one item in one country for one customer segment.*

In the picture above, the columns represent the number of sales transactions at price shown in the horizontal axis. In this example graph, the list price is 153 euros. Another common price is 138 euros which is the price at 10 % discount. 149 euros is the old price which also shows several hits. Finally it is possible to see that the average price is 141 euros, with price varying from 120 to 160 euros.

Morel *et Al.* (2006) describe a pricing cloud, where on one axis there is indexed customer purchase volume and on the other, the discount rate of that customer. The

above pricing band gives only the transaction amounts, but the pricing cloud tackles with annual volume based discounts to customers. Below in picture 24, there is an example pricing cloud.

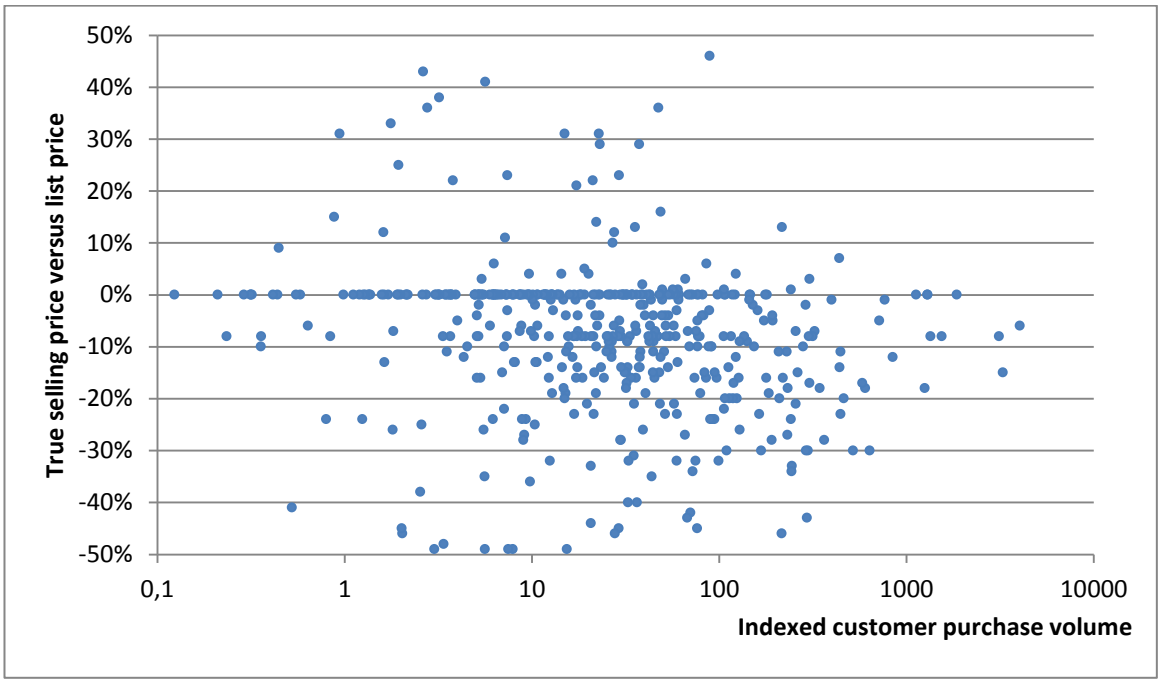

Fig. 24. *An example pricing cloud.*

As picture 24 shows, pricing can seem erratic and discounts have barely any visible correlation to customer size. Note the logarithmic scale for indexed company size. Morel *et Al.* (2006) noticed the lack of correlation. They coined a term “leakage” to define the lost money given as unwarranted discounts.

There have been many studies which are focused on narrowing the pocket price band and thus reducing the variance in pricing. It has been studied for example by Marn and Rosiello (1992), Sodhi and Sodhi (2005), Zornig (2006), and Frank (2003). The basic concept is to find and understand the reason behind price variation and take pricing into control. Marn and Rosiello (1992) provide a tool called the pocket price waterfall, which illustrates the different discounts and other profit-lowering elements of a sold item that don’t show on the invoice, see picture 25 below.

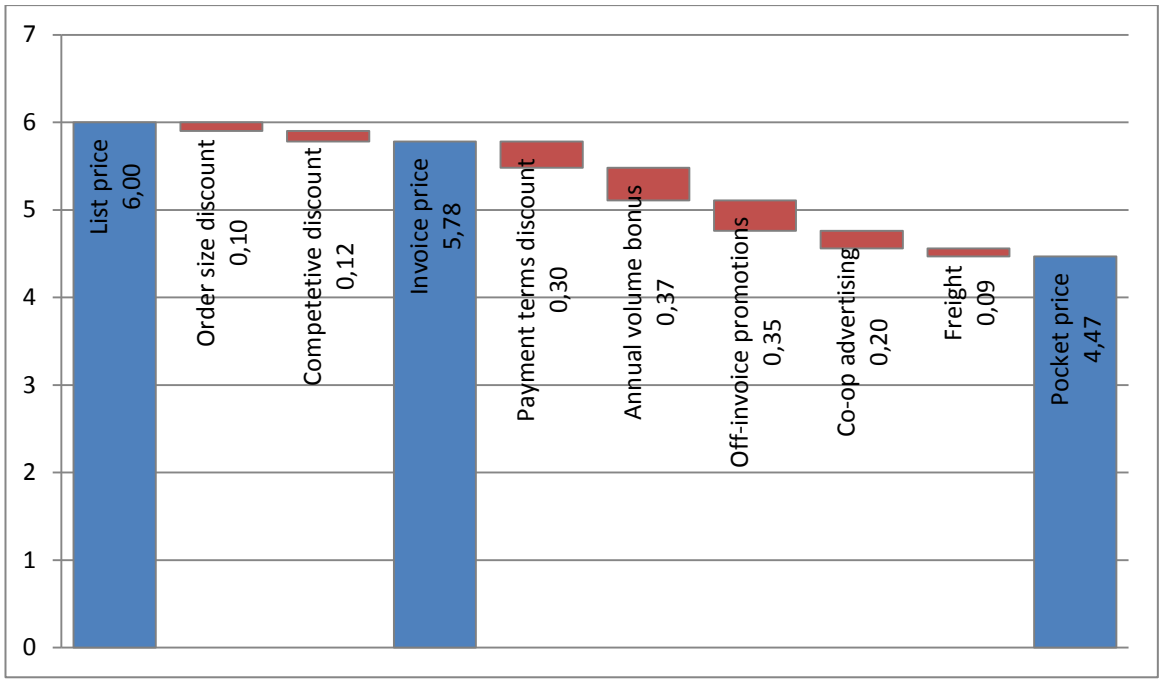

Fig. 25. *In pocket price waterfall, each element represents a revenue leak. Adopted from Marn and Rosiello (1992).*

In the picture 25 above, the pocket price is actually 22.7 % lower than the invoiced amount. Marn and Rosiello (1992) explain that individually each of these reasonable, maximum 6 % discounts don't affect the profitability too much, but summing them together, the effect is significant. The writers cite that for their observed companies, the leak from invoice price ranged from 15 % to 40 %. They argue that price analysis should be made of pocket price, not the invoice price. From price setting point of view, they mention that customers may base their purchase decisions only on certain elements of the pocket price waterfall. In one of their cases the retailers used just invoice price minus cash discount as their reference for comparing prices. When the company moved the off-invoice discounts on-invoice, it looked like lower price for the retailers which resulted 11 % increase in volume in the reported case. Marn and Rosiello (1992) argue that each pocket price waterfall element should be inspected and they should have a quantifiable goal to be reached through the discount. They also reinforce that the waterfall structure can be manipulated for to increase sales.

5.1.4. Improve

Sodhi and Sodhi underline that in this phase, the purpose of the tools is communication which builds shared understanding and consensus. The tools are prioritization matrix, payoff matrix, failure mode and effects (FMEA) analysis is for assessing the risks of the proposed solution, and lastly "to-be" process map can be used to underline the differences between the process as it is now to the process it will be. (Sodhi and Sodhi 2007, pp. 126-128.)

Prioritization matrix is similar to the cause and effect matrix discussed above in measure phase. Unlike in that matrix though, the prioritization matrix lists the proposed solutions against the customer's requirements. Through data-assisted teamwork, each possible solution is given a grade from 1 to 10 depending on how big impact the solution has to the customer requirements. Finally each solution will have priority number which is used to put different solutions in effectiveness or fit for requirements order. (Sodhi and Sodhi 2007, pp. 126-127.)

Payoff matrix is simpler version of prioritization matrix and the use is the same. Each possible solution is scored again with score 1 to 10 but now only for two measures instead of customer's requirements: business impact and ease of implementation. Values are again reached through data-assisted teamwork. Benefit of the simpler payoff matrix is that the results can be drawn into a very graphic manner, see example picture below. (Sodhi and Sodhi 2007, p. 127)

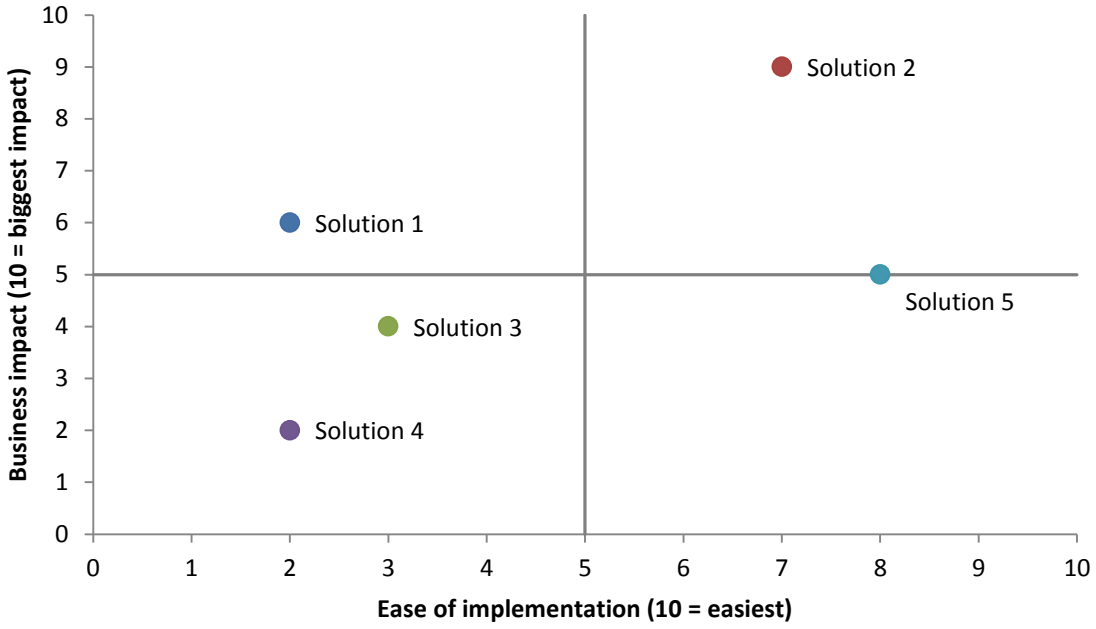

Fig. 26. *Example payoff matrix*

In the example matrix 26 above, solution 2 seems to be easiest to implement and it has biggest business impact which may be measured by profitability increase. Solution 5 is easy to implement, but it hasn't as beneficial impact as solution 2. It might be good to implement anyway because it is easy. Solution 1 on the other hand has a bit greater effect on business than solution 5, but it is far more difficult to implement. Lastly solutions 3 and 4 have only minor business impacts and they are rather difficult to implement, so they could be considered at some bigger business process renewal, but they should not be of the biggest interest.

FMEA can be used to assess risks of possible solutions in a similar way it was used in measure phase to assess risks of process phases and inputs. There aren't any changes to the tool or its use. Also the "to-be" process map is very similar to the process maps described earlier either SIPOC or in a traditional flowchart format. The main point is to assess the process what it will be after the proposed solution and highlight the differences to the current process. (Sodhi and Sodhi 2007, pp. 127-128)

5.1.5. Control

Control is the final phase of DMAIC framework. The use of tools presented here should be in the hand-off document that ends the design part of the project before implementation. Three tools are explained for this phase. They are control charts, exception codes and scorecards. (Sodhi and Sodhi 2007, pp. 128-129)

Control charts follow target parameters over time and they are used to see if process is within set control limits or consistently is outside them showing that the process is not in control. Without control limits, such chart is called a run chart. Related to pricing, control charts can measure for example weekly or monthly the number of defective invoices based upon agreed definition of a defect, average discount level, and the use of exception codes which are explained in next paragraph. (Sodhi and Sodhi 2007, 128)

Sodhi and Sodhi explain that exception codes are useful when a person tries to input data to information system, for example sales representative inputting a sales order, but cannot put the details in the way the person would like to because of strict system. Exception codes allow to input data which isn't strictly allowed by the system, but it would leave a trace that exception code needed to be used. The authors further explain that exception codes allow to track who wanted to use the exception code and who authorized it. (Sodhi and Sodhi 2007, pp. 128-129.)

Scorecards are essentially groups of different measures, possibly shown graphically with informative colors, which explain how a certain process is doing. Specifically balanced scorecard is used to show the direction of entire organization. (Sodhi ja Sodhi 2007, p. 129)

5.2. Assessing value and pricing based on it

The focus to customer value-based pricing is well described in (Hinterhuber 2008, pp. 414-415). The author describes a framework of five steps, where first step is defining and communicating goals, second is value creation and delivery, third value communication, the fourth and most extensively described step is about setting the price level, and lastly fifth step is implementation of value delivery and pricing strategy. Picture 27 below shows the framework.

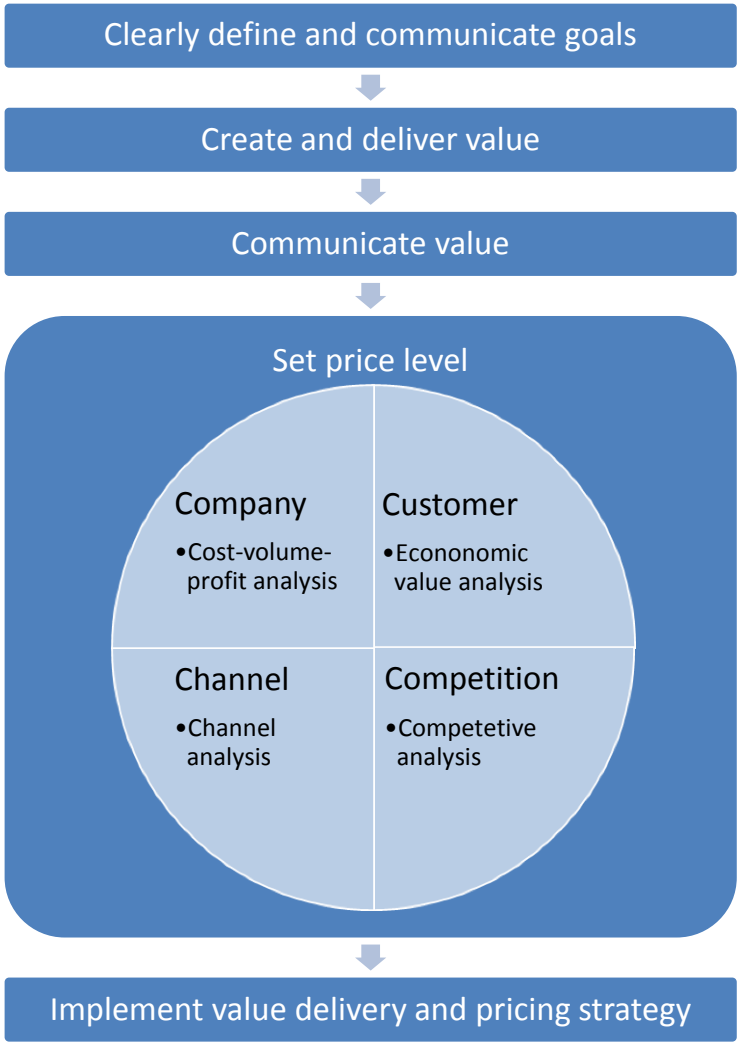

Fig. 27. *Framework for value-delivery and value-based pricing in industrial markets according to Hinterhuber (2008, p. 415)*

The first step of the framework starts by defining the goals. Goals such as market share, market share growth, revenue growth, growth relatively to competitors and profitability growth are usual ones. Hinterhuber argues that market share and market share growth aren not good goals, at least in long term, as market share doesn't significantly correlate with profitability in B2B environment. (Hinterhuber 2008, pp. 414-416.)

Second step in the framework is creating and delivering value. The author lists six dimensions of benefits to customers: the product, delivery capabilities, services, ease of doing business, vendor and self-enhancement. Product itself can be for example reliable, durable, safe, and conformant to specifications. Delivery capabilities refer to supply chain effectiveness; for example delivery speed and reliability. Services include installation, application support, maintenance, and warranties. Ease of doing business refers for example to ordering costs and time, responsiveness to order-related inquiries, and complaint handling procedures. Vendor is about vendor know-how, vendor competencies, new product development capabilities and capability to offer solutions in

addition to product offerings. Self-enhancement is about social status, prestige and aspiration benefits more commonly associated with consumer markets. (Hinterhuber 2008, pp. 394-395 & p. 416) Many of these elements are also described in Biggemann and Buttle's (2011) framework of relationship benefits described earlier in section 4.4.

Communicating value has a hard and a soft component: competitor price plus differentiation value. Both are dependent on customer: firstly what the customer perceives as a competing and substituting product and what he knows of the competitor's price, and lastly differentiation value is always subjective to the customer. (Hinterhuber 2008, p. 417.) It was already discussed in section 4 that different aspects have an effect on demand referring to Kotler and Keller (2008). Hinterhuber (2008, pp. 417-421) lists many of the same considerations. The higher the price difference to the competitor's product, the more price sensitive the customers are. The more unique value there is in the product the less sensitive the customers are to product's price. Buyers are less sensitive to the price of a product the greater the added cost for the customer for switching products. Buyers are less sensitive to price when they have difficulties comparing the proposed product with alternatives. Buyers are less sensitive to product price to the extent that higher prices signal better quality. Customers are less price sensitive when purchase price is a smaller share of the total cost of the end benefit, for example high lawyer hourly rate is tolerable when there's a risk of losing millions of euros. Also, the impression of being fair plays a key role in determining the willingness to buy. List of all the effects customer price sensitivity or willingness to buy are listed in table 6 on next page.

Table 6. *Factors of customer willingness to buy.*

Increases willingness to buy Lowers price sensitivity	Decreases willingness to buy Increases price sensitivity
Product has no competition or substitutes	Product is new
Customer does not notice higher price	There is high inflation rate
Customer is slow to change buying habits (repeat customers)	Product is easy to compare to competitor's product
Customer considers the higher price justified	High price difference compared to competing products
Product price is only a small part of total life cycle costs	
Product distinctiveness	
Costs of the product are shared with another party	
Product cannot be stored	
Product life cycle has reached maturity	
Price signals of better quality	
Customer has an impression of a fair trade	

When product and relationship value is communicated to the customer, the price level is set based on four aspects: company, customers, competition, and channel (Hinterhuber 2008, p. 421). Referring to the Hunt ja Saunders (2008) framework, customer value analysis is the most important of the four at this third level of pricing process maturity. Company and competition analyses were conducted already in earlier levels.

Hinterhuber (2008, pp. 422-426) divides analyzing customer value to six steps: defining the competing or substituting product and identifying its cost to the customer which is usually price, second step is segmentation based on customer perceived value, third step is about identifying the product differentiators that make the product offering different from competing products. During fourth step the value to the customer is analyzed for each differentiating factor and for each identified market segment. Fifth step is calculating the price for the product, which is the reference price of competing

product plus differentiation value; this tends to vary from segment to segment. Sixth and last step is estimating future sales by assessing customer willingness to buy the end product at different prices.

5.3. Pricing optimization process

Hinterhuber and Liozu (2012) assess that price getting or price realization refers to the capabilities as processes that ensure that the price the company gets is as close as possible to the price the company sets. The writers list that the price realization capabilities reflect a number of factors:

- The existence of pricing rules specifying maximum discount levels for any given order size
- The extent to which these rules and guidelines are actually followed
- The organizational consequences for not following these guidelines
- The extent to which sales personnel have to justify and ask for approval for deviating from list prices
- The negotiation skills of sales personnel
- The degree to which sales associates understand a customer's best available alternative
- The customer's maximum willingness to pay and the differential value to customers of the company's product and service offering
- The existence of clear target prices before sales personnel enter into negotiations with customers
- The amount of pressure that pushes sales personnel to conclude unprofitable deals
- The extent of free services offered to customers to close a deal
- Systems in place to monitor and communicate price deviations to sales personnel, marketing managers and other decision makers

Hinterhuber (2008, p. 435) mentions that companies which follow a fixed-price policy, where sales personnel cannot deviate from list prices, generate the highest levels of gross-margin. Prices can vary from segment to segment which allows some flexibility, but the segmentation principles should be out of sales personnel's control. This speaks for tight control.

Sebastian and Maessen (2010) say that pricing power comes from three sources: cost volatility and price management, price premium capturing, and finally price leadership. Pricing power means that a company can transfer cost increases without delay to prices without losing business to competitors. Price premium can be captured when the added value of products is transferred to prices and those prices are realized. The authors call it value-skimming. Price leadership comes through price transparency. They initiate, prepare and implement price increases in a professional manner. The authors have listed 10 indicators of pricing power. They are listed below in importance order.

- High degree of product/service differentiation
- Good value and price argumentation in sales talks

- Profit orientation throughout the company
- Clear escalation levels in price management
- Products with high degree of innovativeness
- Leading market position
- Sales strategy which aims at pull effects
- Possibilities of capacity adjustments
- Stable, predictable market environment
- High vertical integration

Sebastian and Maessen (2010) report that companies, with strong pricing power have a pricing process with clearly defined roles and responsibilities, and they have a pricing manager, who supports decision making within the pricing process. The companies also have price-related key performance indicators showing possible inconsistencies and price gaps and target fulfillment. They say that companies with pricing power pursue balancing margin and volume targets through pricing and capacity management, they create, defend and further develop performance advantages, they have a pricing logic for consistent price differentiation and price corridors including target, limit and walk-away prices. They define contract elements such as duration and negotiation periods to strengthen their own pricing position. They apply surcharges to better manage cost volatility and they charge for value-added services for example through de-bundling. They coach management on price leadership and train sales force.

5.4. Time value of money

Companies have long-term contracts with customers and usually the payment terms give leeway to customer to pay after several weeks or even months. Sebastian and Maessen (2010) mention that contract elements like duration should strengthen company's pricing position and surcharges should be applied to better manage cost volatility. Joshi (2010, pp. 25-26) explains the time value of money using risk-free assets like government bonds of well-established countries. He also uses compounding interest rate rather than annualized rate for mathematical purposes. The formula for a forward price is shown below.

$$S_T = e^{rT} S_0 \tag{35}$$

In the formula 35 S_T is the price at time T, when S_0 is the starting price and r is the continuously compounding interest rate (Joshi 2010, p. 26). Since business is risky Neilimo and Uusi-Rauva (2007, pp. 216-217 & pp. 222-223) suggest to use internal discount rate or target return on investment (ROI) instead of the interest rate.

As an example, a customer wants to buy a product worth 1000 €, but with 90 days term of payment. Selling company achieves 12 % return on investment. If the customer paid the product immediately, the company could reinvest that 1000 € for annual 12 % returns. 12% annual rate corresponds to continuously compounding interest rate of

$\ln(1.12) = 0.1133$. Within 90 days that investment would be $1000\ € \times e^{0.1133\times(90/365)} = 1028\ €$. Similarly, if the prices were discounted using the same rate, the actual price the customer pays in today's money is $1000\ € \times e^{-0.1133\times(90/365)} = 972\ €$. In this example, the 90 days payment term has the same monetary effect as 2.8 % price discount. The effects of payment term translated into a discount is pictured in picture 28 below.

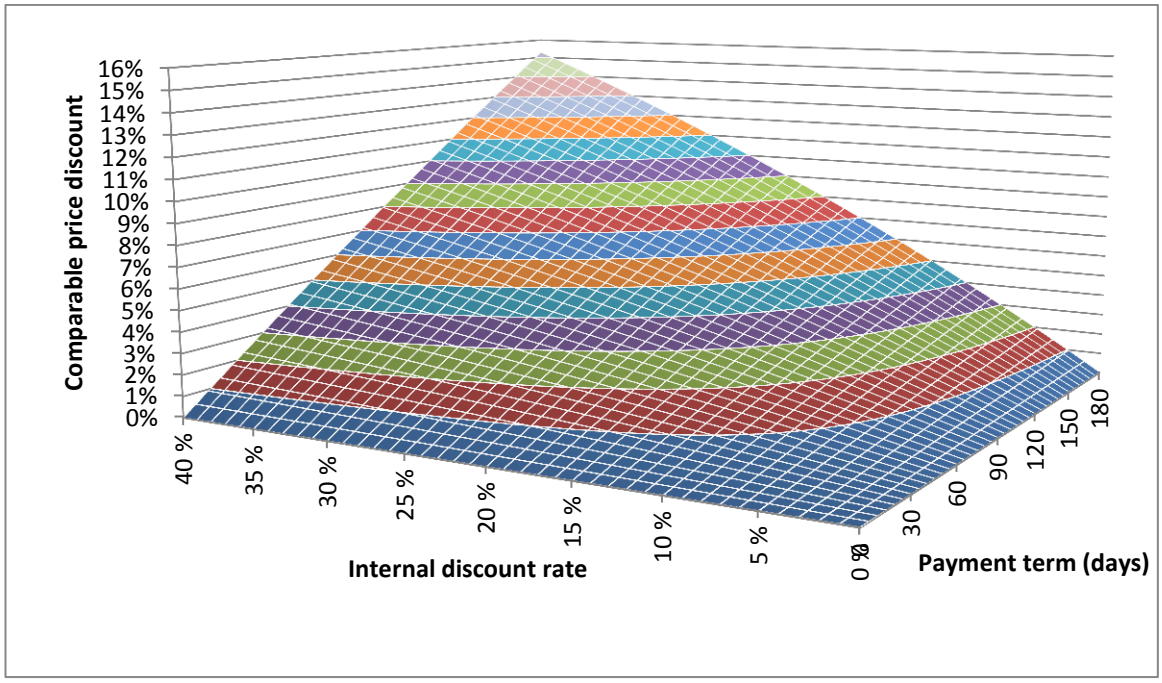

Fig. 28. *Payment term's effect to revenues shown as discount.*

In the picture 28, the right-hand axis shows the payment term in days, left axis shows the internal discount rate or ROI. The height of the surface shows the comparable discount if the payment was received immediately. Note that even with 30 days payment term and 13 % discount rate, the discount is already 1 %.

Similarly, providing the customer the option for partial payments without any extra fee can be seen as a discount. The more monthly payments, the more customer receives discount. The discounted value can be calculated using the following formula, which basically applies the formula 35 presented above a fixed number of times:

$$\sum_{t=1}^{T} \frac{S_0}{T} e^{-rt} \tag{36}$$

In the formula 36, t denotes time in months, T the total of partial payments. Consider the example above with 1000 € price and 12 % internal discount rate, but now with 5 monthly partial payments 200 € each.

$$\sum_{t=1}^{5} \frac{1000}{5} e^{-0.1133 t/12}$$

$$= 200e^{-0.1133\times 1/12} + 200e^{-0.1133\times 2/12} + 200e^{-0.1133\times 3/12} + 200e^{-0.1133\times 4/12} + 200e^{-0.1133\times 5/12}$$

The sum results 972 €, a 2,8 % effective discount. Note that the first payment isn't immediate, rather with one month payment term. Below is shown equal monthly partial payments' effect to actual realized price in terms of discount:

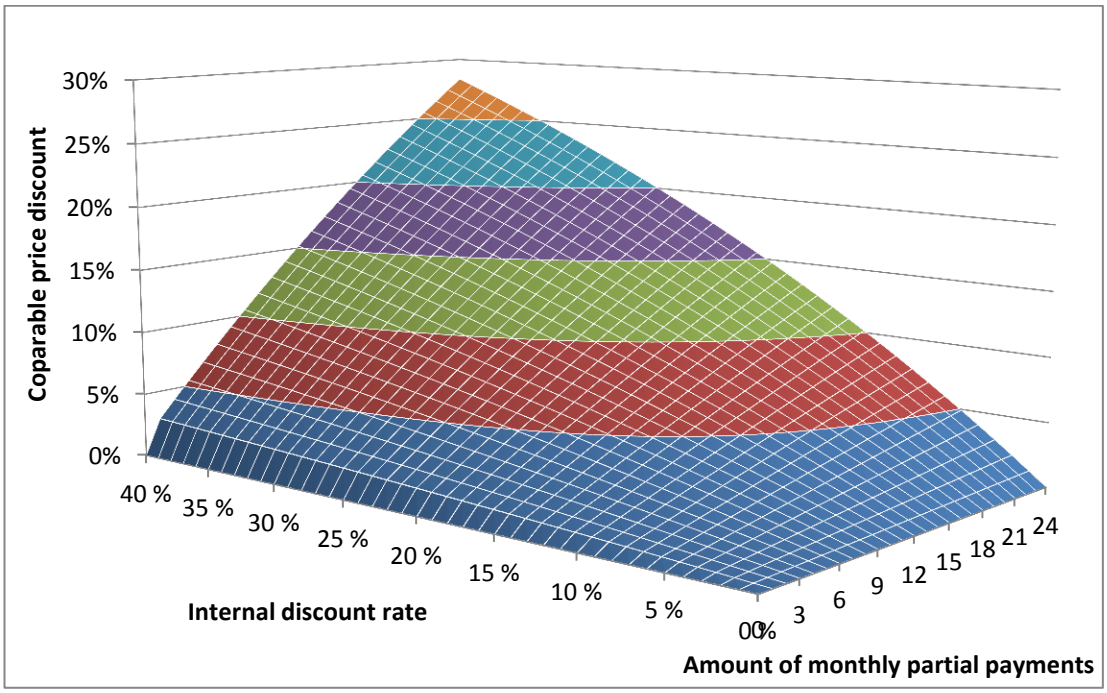

Fig. 29. *Monthly partial payments' effect to revenues shown as discount.*

In the picture 29 above, it is noteworthy that the effective discount rises quickly. 12 months in partial payments and 10 % internal discount rate or ROI results a 5 % effective price discount.

To have more ability to forecast expenses, some customers want to set a price level for purchases for duration of many years. Referring to the examples above, money has time value, but the correct price for a product for many years is still debatable. Above, there is listed the formula 35 for forward price. Sometimes though, customer would like to have an option to pay using current list price instead of the list price which is in effect after one year. Assuming that price is set based on variable costs gives possibility to valuate an option to pay current price instead of list price at time t. In the formula 37 below, price at time 0 is set based on variable costs + margin.

$$S_0 = C_{V0} + M \tag{37}$$

Variable costs are treated as a variable, margin as constant. After time t, the price is adjusted against currency inflation, but also the variable costs that follow a different stochastic process may have changed warranting a price change (36).

$$S_t = (C_{Vt} + M)e^{i\Delta t} \tag{38}$$

$e^{i\Delta t}$ is the inflation, where i is the continuously compounding inflation rate and Δt the time inflation has affected the price. It is possible to see, that price after one year is the costs plus constant margin and corrected for currency inflation.

Assuming variable costs derive from raw material price and in case of international company the currency inflation in the manufacturing country; those can be used to simulate the stochastic process. Then the European call option to change price list can be valuated using Black-Scholes formula for an estimation (Joshi 2010, p. 120).

$$C(S, K, \sigma, r, T) = S_0 N(d_1) - Ke^{-rT} N(d_2), where \tag{39}$$

$$d_j = \frac{\ln\left(\frac{S_0}{K}\right) + (r + (-1)^{j-1}\frac{1}{2}\sigma^2)T}{\sigma\sqrt{\mathrm{T}}} \tag{40}$$

For example, price of steel is 750 USD/ton, its monthly standard deviation of past year prices is 35 USD/ton, variable costs make 70 % of product price and it takes half a ton of steel to produce and other variable costs being 325 USD, margin being 30 %, risk-free interest rate in sale country is 5 %. Price S_0 is therefore 1000 USD as presented below.

$$S_0 = \frac{750\ USD \times 0.5 + 325\ USD}{70\ \%} = 1000\ USD$$

European call option value is calculated below. Standard deviation is entered as a percentage of the price and takes into account that only half a ton of material is used and that strike is 1000 USD.

$$d_1 = \frac{\ln\left(\frac{1000}{1000}\right) + \left(\ln(1.05) + \frac{1}{2}(\frac{17.5}{1000})^2\right)}{(\frac{17.5}{1000})} = 2.7968$$

$$d_2 = \frac{\ln\left(\frac{1000}{1000}\right) + (\ln(1.05) - \frac{1}{2}(\frac{17.5}{700})^2)}{(\frac{17.5}{1000})} = 2.7793$$

$$N(2.7968) = 0.9974$$

$$\mathrm{N}(2.7793) = 0.9973$$

$$C = 1000\ USD \times 0.9974 - 1000\ USD\ \times e^{-\ln(1.05)} \times 0.9973 = 48\ \mathrm{USD}$$

With these variables the option, if given free, is worth the same as a 5 % price discount. Using forward price instead of current price for strike practically removes the discount. If company target ROI would be 15 %, then forward price would be 1150 USD, which then used to evaluate the option would give option value of 0.00 USD.

Other way to reduce risk of long-term contracts is to have price escalation clauses and surcharges. Sebastian and Maessen (2010) mentioned fuel, environmental and energy surcharges to be applied on prices to better manage cost volatility. Kotler and Keller (2008, p. 443) mention that escalator clauses are common for industrial projects saying that price increase is tied to a certain index, for example inflation.

6. RESEARCH METHOD AND MATERIAL

Using Saunders *et Al.* (2009) summary of research methodologies, the study is done using realism philosophy, deductive approach on case study strategy. The mixed-method research uses longitudinal data, but the analysis is done cross-sectional. For data collection case company ERP database is used to provide detailed business data and analysis is done using mostly statistical tools and graphics. These quantitative data is understood and put into perspective by interviews and personal experience in the case company. A picture 30 below illustrates the possibilities and choices which are further explained later.

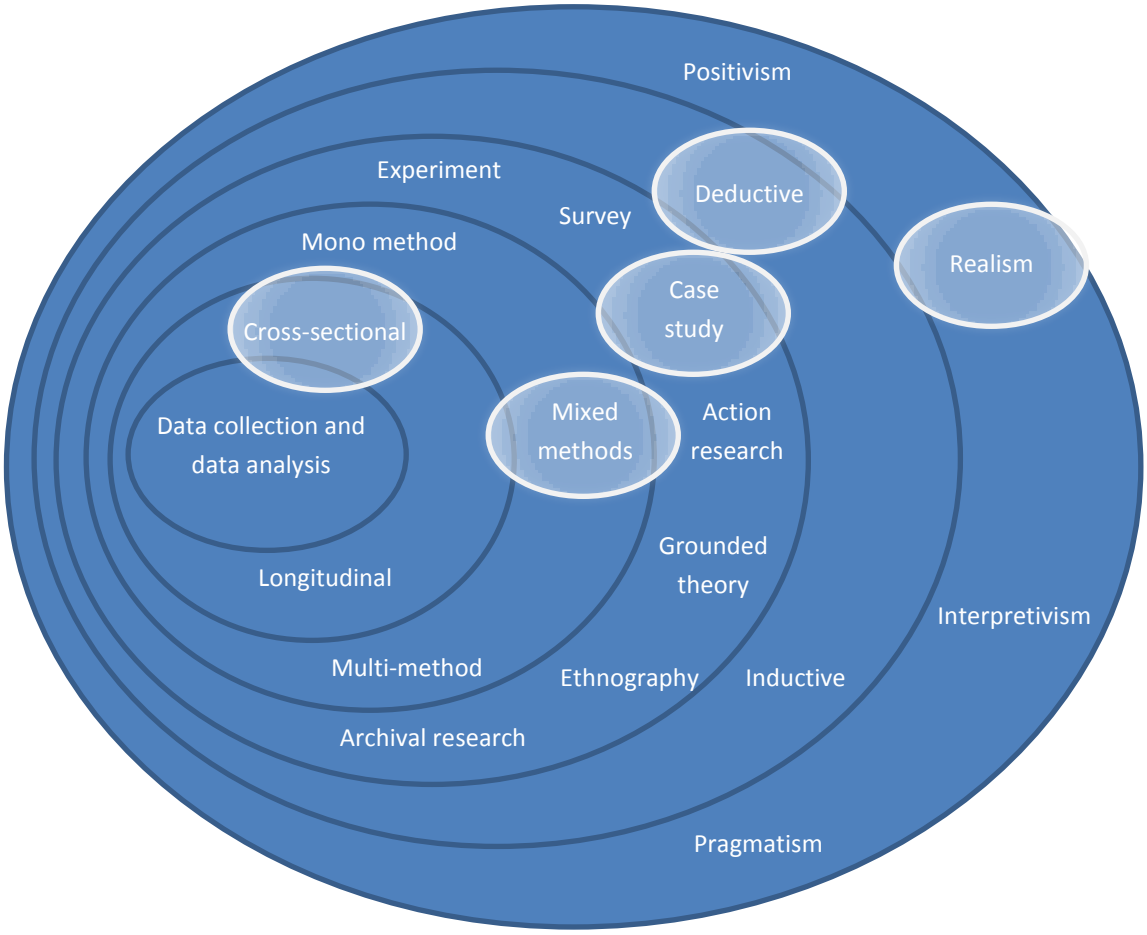

Fig. 30. *Summary of research methodology choices. Adopted from Saunders et Al. (2009).*

Topic, materials, methodology and strategy were given from the case company. The company's intention is to seek pricing process knowledge from academic sources and see those applied in practice. The best way to achieve their wish and to make an

adequate master's thesis at the same time is a compromise. In this thesis a realistic research philosophy was chosen as it seeks holistic understanding of the underlying processes. Deductive reasoning was chosen as theory largely exists already and the function of this study is to seek points of improvement in the existing process thus comparing theoretical model and *de facto* process. Case study was chosen, as comparative material from other companies is very difficult to get on such sensitive subject. Case study can also provide deeper understanding of case company's process, which is the focus of this thesis. Mixed methods were chosen to combine both statistical data from company's ERP and interviews to deepen the understanding of the data. Interviews are supposed to facilitate understanding of the data and fill the gaps between relations found from the data. Although one-year data would allow the use of longitudinal data, the purpose of this thesis is not finding causal relationships. Data is treated cross-sectional instead to set a base level of current process and to identify points of improvement.

A process flow explained in the theory sections, largely citing Sodhi & Sodhi (2007), is used as a structure for the study. Only define, measure and analyze parts are used of the DMAIC process, but the results of this thesis are suggestions for improvement and control. These steps were first introduced in the theory part and are further explained point by point later on.

6.1. Data analysis

The subsections here have been removed from this public version of the thesis to protect case company's confidential information.

6.1.1. Definition

6.1.2. Measurement

6.1.3. Analysis

7. RESULTS

This section has been removed from this public version of the thesis to protect case company's confidential information.

8. CONCLUSIONS

Lack of relation between customer size and the price they pay combined with the excessive use of manual pricing hiding the discount reasoning are clear signs that the prices are out of control. Prices are set using market price levels taking into account production costs for floor price. Customer value based pricing and life cycle services are being implemented, but they do not represent a significant part of sales. Returning to Hinterhuber and Liozu's framework, the case company is at early end of price realization and middle part for price setting. See picture 57 below.

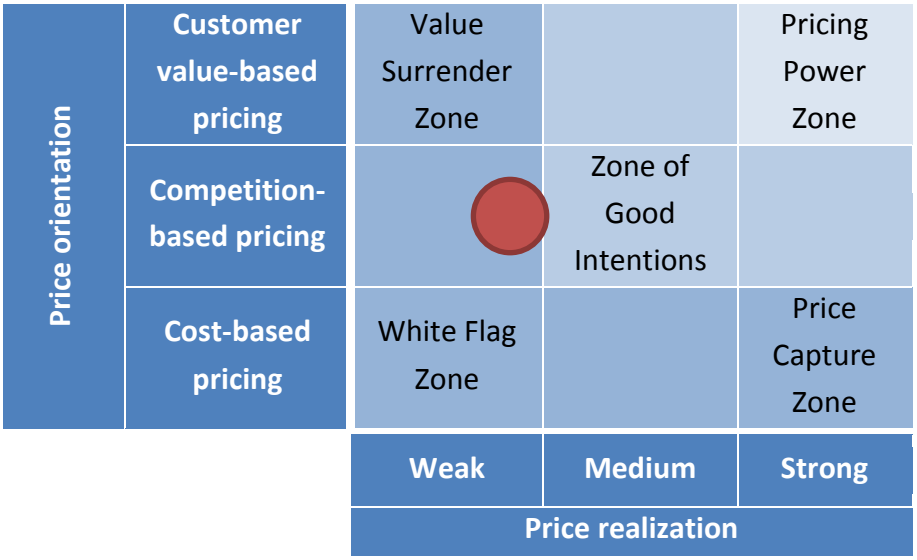

Fig. 57. *Pricing power matrix (Hinterhuber and Liozu 2012) with case company's position.*

The picture summarizes the findings discussed in section 8 for price realization into a single scale. As was found out, price reasoning is not visible for later analysis and from statistics point of view, the price variation seems erratic. From the other pricing power framework from Hunt and Saunders (2008), levels one and two have components in their description that match the situation of case company. Namely discounting is common, price management sets and updates price lists but final price decision is sales representative's or sales manager's responsibility. The analysis on sales is especially internal; monthly analyses are conducted on sales and prices on detailed level.

Continuing from table 6 presented in section 6.2., price setting can be improved to value orientation by assessing the value of the products for customers. Those customers should be segmented as discussed in section 5. and when the prices develop to the direction of customer value based pricing, price control can be tightened. Table 13

below lists all the elements found from literature and mentioned earlier in this thesis that affect demand and price sensitivity.

Table 13. *Factors affecting demand and price sensitivity*

Increases willingness to buy Lowers price sensitivity	Decreases willingness to buy Increases price sensitivity
Product has no competition or substitutes	Product is new
Customer does not notice higher price	There is high inflation rate
Customer is slow to change buying habits (repeat customers)	Product is easy to compare to competitor's product
Customer considers the higher price justified	
Product price is only a small part of total life cycle costs	
Product distinctiveness	
Costs of the product are shared with another party	
Product cannot be stored	
Product life cycle has reached maturity	
Increases demand	**Lowers demand**
Low price	High price
Promotions and marketing	Lower value for customer
Lower price compared to competitors'	
Higher value compared to competitors'	
Increase in customer's customers' disposable income	
Increase in customer's products' demand	

In the table 13, many of the elements could be mirrored on the other side as well meaning that if higher product's value compared to competitor's product's value increases product's demand, lower product value compared to competitor's product's value lowers demand. The factors that are relative to product's properties compared to those of competitors' products' are dynamic: when a competitor raises prices or lowers their products' value, the measured product's demand raises.

For the case company in its task to manage aftersales parts and services prices, the base price can be set and adjusted based on product newness and distinctiveness. Also different parts can have different price levels: proprietary spare parts can be priced significantly higher than competition compared to easy to manufacture wear parts. The price can be modified by country and be adjusted based on local inflation, competition and market trends of customer's customers' demand. Customer segmentation is handled on segment specific products: Small and mobile crushers for construction contractors, small and mostly unmovable crushers for quarries and small mining operations, large crushers for big mining operations. This segmentation can be further adjusted based on rock types and the optimum combination of crushers and their parts based on rock type and desired production capacity and end product. This customer segment price can later be adjusted based on collected intelligence on customer willingness to pay and price elasticity. Global customers wanting a global price list can have that on a case-by-case basis.

Long-term contracts should be based on time value of money taking into account case company's target return on capital. The contracts should be entered into ERP in such a way that they are easy to monitor and update when needed. Either price escalation clauses or a form of forward pricing or real options allow case company to prepare for cost changes during the contract term. Price escalation clauses push the risk of cost increase to customers. Option pricing on the other hand takes that risk into account as higher price the same way as insurance.

Discounting should be avoided and more strict controls put in place. For example when a sales order is placed into company ERP, if it is priced significantly below the list price, a prompt could ask the reason behind the discount for order reason field. Possible way would be to increase the amount of discount conditions that modify the list price. Instead of the current practice of using a manual price, it would be better to use a discount term with a name. Based on the material collected for this thesis, following discount terms could be considered.

- Order size discount – less bureaucracy and incentive for more revenue.
- Customer size discount – based on customer purchases the past quarter or year. Incentive for more revenue.
- Competitive discount – discount given to win a bid. Shows that there is price competition on the item and item price might need revising.

- Repeat customer discount – Customer has bought produce for a long time. This can be applied instead of long-term contract pricing as per customer lifetime value on the assumption that the repeat customer will continue to be a repeat customer.
- Marketing aid discount – Customer will serve a reference for case company providing marketing support in form of advertising and performance data.
- Dealer discount – Customer will resell case company products. Discount can be higher if the dealer holds its own stock and warehouses.
- Customer type discount – Certain customers are not the consumers of case company's produce, they might be dealers and resellers but also manufacturers that resell the modified case company product back to the case company. These would need to be treated separately not to confuse the end user price with other prices.

The discount is treated as a monetary value but it can be sold in many different ways to the customer. For example sales representative can offer freight for free, additional warranty, better payment terms or other complimentary services. Surcharges need also some standardization and they should come from the case company ERP automatically. Surcharge conditions should include at least freight. In long-term contracts, there can be surcharges for increased material costs and such to act as price escalation clauses.

Most importantly of the previously mentioned techniques to vary prices is training of sales personnel. The FMEA table showed that sales personnel have the biggest impact on pricing inaccuracies and leakage. They should know the rationale behind prices and how to use the different discount terms and surcharges. Not only these limitations and guidelines, the sales personnel should be guided with a bonus system based on profits rather than revenues. In case of the case company and its price system, bonus could be paid based on the list price and how well it is followed. For example following bonus system which is based on list price and profitability target according to following formula:

$$BB = Q \times \left(P_S - \left(P_L \times (1 - Profitability\ Target)\right)\right) \quad (42)$$

In the formula 42, the bonus base (BB) is the number on which the bonus is based. If all prices were based on cost-plus method, the list price would be cost divided by 1 – profitability target. In the formula it is assumed that the list price is based on a similar calculus. Thus for profit based bonus for sales representatives, the sale price P_S is compared against a "cost" derived from list price. In the case of more complex pricing than cost-plus, the relation between the cost and price isn't the same. For the purpose of paying sales personnel's bonuses, the formula 42 is enough. It also would make the sales representatives more eager to offer good prices and avoid price discounts. In future list price negotiations the sales representatives would want to lower the list price as much as possible to maximize their personal bonuses. Unless a more complex bonus system is devised, which would take into account revenues as well, sales personnel cannot be given the final vote to set the list price.

This thesis has reached its research question. The two sub-problems presented were: How prices can be maintained and how they can be realized to greatest extent and finally how these two should be applied to the case company considering industry's and company's unique characteristics.

To summarize, biggest gains in controlling prices are gained by training sales representatives and their assistants who place the sales orders into ERP. Globally standardized practices in placing and processing sales orders in ERP make following them easier and is less prone to confusion. Sales representatives should have incentives that are in line with company policy and directly ordered in the hierarchical structure deriving from company strategy and goals.

Clearer information can be gained about prices if segmentation is finer and pricing decisions are visible. That way segments can be measured independently and later treated differently from one another to set multiple price points to gain more market and more profit. Furthermore when segments are clearly defined and the customers in each segment act cohesively, their actions can be measured and forecasted more precisely. When such segmentation and intelligence gathering is in place, educated price adjustments can be made where table 13 serves as a good starting point.

The results of this thesis agree with theory that there are varying prices and statistically the variation is not very well explained by segmentation, customer size or other measured variables. According to literature, there are many improvement points to be implemented. Literature agrees that tighter control on price levels and correct incentives increase profitability and profits which lead to long-term growth. A good follow-up analysis would be over a time-span to see if the case company actions, would improve the profitability. Also more research could be focused into B2B pricing especially from price realization point of view; similar studies as this thesis do not really exist.

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APPENDICES (5 pieces)

Appendix 1:	SIPOC tables
Appendix 2:	FMEA table
Appendix 3:	Price bands of items sold
Appendix 4:	Regression summary leakage
Appendix 5:	Regression summary average price

Appendices are removed from this public version of the thesis to protect case company's confidential information.